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THE ROLE OF DENTAL SEPSIS IN SYSTEMIC DISEASE.

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AFTER centuries of belief in superstitious forces as the cause of disease, there occurred in the nineteenth century a swing toward a more dialectic interpretation: illness was to be explained only on the basis of observed structural alteration—morbid and microscopic. Thus arose the Virchow concept, wherein gross or microscopic pathological changes had to be present before disease could be adequately accounted for. Because specific morbid changes occurred during these reactions to disease, specific names were given to these changes. This produced the impression that specific diseases were being described, whereas the names referred only to certain pathological processes—for example, cirrhosis of the liver, chronic gastritis.

With the discovery of bacteria, all such pathological states were ascribed to some germ attack, and here the position stood for some half-century; disease was to be accounted for only by pathological change, and this in turn from bacterial causes. However, the introduction of biochemical methods led to the recognition that gross variation of function could occur in an organ apparently morphologically normal. So there occurred a gradual swing of the pendulum; functional aspects of disease gained prominence and the factors responsible for functional mechanisms were investigated. Gradually it was realized that a complex pattern of control existed and that nervous, environmental, nutritional and hormonal factors all played an equally vital part. When all are in a state of balance we recognize the state of health, while when they are out of balance we recognize disease. The equilibrium being a complex one, the factors upsetting it are therefore usually multiple, and to look for a simple direct relationship between a given pathological change in a focus and some defect at a distance from it is no longer possible or necessary. This viewpoint is summed up in a previous comment made by the writer in a lay journal:

> Medical philosophy is just beginning to appreciate the broad view that the process of living represents a series of episodes and conflicts requiring from us constant adaptation; health depends on the maintenance of a state of balance between the individual and his environment.
>
> In such a balanced system where the loads are unpredictable and varying, adjustments must be ever changing, and the weight on one side of the scale must be altered according to the opposing load. The mechanisms of adjustment are automatic and not under direct control; in health we are not aware of their existence. Should, however, some overwhelming attack occur, for example, from outside the body (germ infection, emotional upset), or from inside by a chronic degenerative process, then the automatic regulating mechanism can no longer perform effectively and abnormal function results. This constitutes disease.

Controlling the many factors almost as a gyroscope prevents off-balance states stands the endocrine system with its cortisone and anterior corticotropic hormone (ACTH).

[1] Read at a meeting of the Victorian Branch of the British Medical Association on June 6, 1951.

The discovery of these products has only confirmed effectively what every physician must have recognized by experience—that the soil or material within us can adjust itself to stresses, internal or external, by alteration of connective tissue reactivity. The mode of action of this mechanism via the endocrine system is to control individually in each person the reaction of collagenous tissue to an irritant, focal or otherwise. The quality of any inflammatory reaction may therefore vary widely with the same source of infection, and sepsis in one individual may produce profoundly different effects from sepsis in another.

It is in such vein that we approach the dental problem, recognizing that both soil and seed are in a constantly changing kinetic state of balance. This incessant battle, for example in infection, in which on the one hand the organism changes from minor to major virulence by mutation *et cetera*, while on the other the individual adapts and alters his defences, constitutes life as we know it. Here the attacker and here the attacked gain ground and sometimes the battle hovers. Burnet (1945), referring to organismal infection, stated: "It is rarely a case of straightforward invasion; rather the result of infection in a body which for one reason or another fails to measure up to the normal standards of resistance." To dissociate oral infection from the remainder of the body is to ignore the global nature of the warfare and to sit complacently in one's own domain awaiting the inevitable attack in a state of isolationist pseudo-safety. Such a policy can be supported only by those who fail to appreciate the true interrelationship of human physiology, and is contrary to all present concepts of disease.

If one should regard this as pure philosophy and of no practical importance, let us look to diseases like rheumatic fever, in which "distant manifestation can be clearly related to a localized infective process" (Burnet, 1945). The fact that this disease may be effectively controlled by an internal hormonal secretion (cortisone) shows that its manifestations are not simply the result of direct infection alone, but that the soil factor plays an important part. Confirming this view is the observation that if one interrupts such therapy in the active phase the disease reaction which we call rheumatic fever will recur. It would seem, therefore, that repeated streptococcal infections can cause an altered tissue reactivity in some individuals, and to this altered state the name rheumatic fever is given. The *Streptococcus hæmolyticus* alone cannot reproduce the disease in animals, because the required alteration in reactive tissues has not been achieved.

Here, then, is a serious challenge to the bacteriologists' adherence to "Koch's postulate", wherein it is asserted that for an organism to be claimed as the cause of the disease, it must on inoculation into other animals reproduce it exactly. Such requirement does not take into account the change in soil produced by repeated infections over the years. Whether we call this change in soil "allergy" or by any other name, it is the *modus operandi* by which a focus acts and it constitutes the main hazard of focal infection. From this point of view the danger is both potential and actual, and because the teeth are the most frequent source of persistent infection they may be in consequence the major source of the so-called collagenous diseases. Common to this group we find eosinophile cells, arterial and connective tissue changes, and indeed in general a similar histopathology. "Fibrinoid" changes in collagen, for instance, are seen in rheumatic fever, *periarteritis nodosum*, *lupus erythematosus*, *erythema nodosum*, arteriosclerosis and nephritis, and while no claim is being made here that each has a dental cause, it is a pity that minor morphological differences have resulted in each receiving a special name. It would be more accurate to recognize that each represents a variant of the collagenous reaction, and that the initiating process of infection or even "allergy" may indeed be of a non-specific variety. To await proof of a specific limited infective cause for each is to set the clock back to Virchow concepts of pathology.

In the light of these remarks we may perhaps examine the comments of Professor H. K. Ward (1948), who has devastatingly criticized the concept of focal infection. In a discussion on this subject he stated: "Only knowledge of the true ætiology of a number of human diseases will save teeth from sacrifice on the altar of focal infection." This implies a specific single label for cause and effect in all disease states—a view no longer tenable (even in typhoid fever focal infection could be of significance). Professor Ward further stated: "The case against the routine extraction for prevention or cure is not justified." This is correct if "routine" is taken literally to mean in all cases, for it implies that all cases are alike. However, when he holds that X-ray proof of rarefaction is not sufficient proof of infectivity, and when the view that toxic absorption from such areas can be accepted only if the toxin is isolated as in diphtheria, then no consideration is being given to the soil factors in disease.

With an organism as protean as the streptococcus and particularly in an individual whose reactions vary because the infection is of long standing, no comparison can be made with the simple pathogens like those of diphtheria, which come as sudden sporadic invaders. To state, as Professor Ward does, that "no one would take exception to removing a tonsil, appendix or decayed tooth for persistent local pain, but to remove in the hope of curing a systemic disease elsewhere is merely clutching at a straw", is to provoke at once the challenge—need "pain" alone be the criterion of an active dangerous infection? Then what of the gangrenous appendix wherein pain disappears at the moment of greatest danger? And how much pain is present in the patient with active tuberculosis of the lung? Great exception would be taken to the removal of septic tonsils only for pain, and an appendix should never be removed for this reason alone. When pain is present it is only an incident, and the operation is performed to save life, not to relieve pain. If nothing is to be done about infected teeth with gross X-ray changes until final proof is forthcoming, and if the proof demanded does not take into account the changing nature of the soil in relationship to such infection, then far from "sacrificing teeth on the altar of focal infection" we will be sacrificing the patient. Burnet and Fenner (1949) conceded that with focal infection "the conditions are too complex to be amenable to strictly scientific approach". Thus to ask for proof of the order of Koch's postulates, to disregard clinical evidence completely as biased and not taking into account the natural history of the disease, to deny the possibility of absorption of some toxin from an area of infection whether such toxin can be isolated or not, is to be destructive and unhelpful. If with the limited techniques available to him the bacteriologist is unable to explain observed phenomena, it would be wise and indeed necessary to enlist the aid of other biological groups in their elucidation. In this regard, the simple objective observations of the physician are as important as those of other biologists. We may therefore submit the evidence related to focal infection under the following headings: (i) the work of Burrows on the localization of disease; (ii) the work of Okell and Elliott and others on the production of bacteriæmia on movement or extraction of infected teeth; (iii) the widespread observations on bacterial endocarditis; (iv)) the work of Brock on the transfer of materials from mouth to bronchial tree; (v) the clinical evidence.

The Work of Burrows (1932).

In 1932, Burrows showed that foreign proteins, dyes and viruses, when injected into a given area, entered fields of irritation well removed from that area. Thus in an experiment with the rabbit's ear, isamine blue injected into one side appeared on the opposite ear irritated by being rubbed with chloroform. By careful collation of all then existing evidence Burrows suggested that disease became localized to a site because of regional tissue changes. He concluded that, "viewed in the above light, life would appear to consist of the maintenance of potential differences at the cell boundary, in a supply of oxygen on the one hand and all metabolic products on the other". Thus he emphasized, perhaps for the first time, the significance of changes in the "soil".

The Work of Okell and Elliott (1935).

Okell and Elliott showed—and much subsequent work has confirmed this—that movement or extraction of teeth produces a temporary bacteriæmia. If, then, organisms can pass through the reactive localizing barrier of the infection, it is not difficult to postulate that molecules the size of toxins may also reach the systemic circulation under similar circumstances. Their effect would then be determined by the state of reactivity of the individual and not by the nature of the infecting organism alone.

Bacterial Endocarditis.

Undoubted proof now exists that subacute bacterial endocarditis arises in the main from dental suppuration. In 1945 33 cases were presented, in nearly all of which gross dental infection was present and *Streptococcus viridans* was isolated. This organism is also found in the majority of dental cultures (Davis, 1945).

The Work of Brock (1946).

Quinn and Meyer, quoted by Brock, showed that lipiodol introduced into the nose during sleep flows readily into the lungs. From this it was not difficult to accept the view that during sleep materials may enter the trachea from the pharynx, especially during snoring or when sleep is accentuated by drugs. In such cases the infected material may be derived from nasal sinuses or tonsils; "but in most cases it comes from gross dental sepsis, usually gingivitis, tartar deposits, gum retraction and pockets". Of Brock's series of 50 cases of lung abscess, gross dental sepsis was present in 20, while Stern in 1936 found that 84% of cases were due to dental sepsis. The evidence produced in this work is essentially clinical and does not go so far as to reproduce Koch's postulates. It is nevertheless acceptable on the grounds submitted.

Clinical Evidence.

The following cases would seem to lend support to the view that dental sepsis can aggravate or produce systemic disease. A very much larger number of cases could be submitted, but this would not necessarily further enhance the claim. The following cases are representative only and presented in a direct, objective fashion. The conditions are as follows: (i) febrile syndromes of obscure type; (ii) respiratory syndromes, especially in old people; (iii) myositis and fibrositis—often in the chest wall, simulating angina; (iv) pyelonephritis; (v) bacterial endocarditis; (vi) jaundice in some cases; (vii) miscellaneous states, including pemphigus and skin disease.

Dental Infection Related to Fever of Obscure Origin.

When pyrexia is unexplained, after virtually all tests have given negative results, there remains a group broadly classified as the collagenous diseases wherein the essential feature is an alteration of collagenous tissues brought about by some site of persistent infection. These diseases are characterized by eosinophilic reactions in the blood and may variously present as *lupus erythematosus, erythema nodosum*, Libman-Sacks syndrome, *et cetera*. Klemperer, Pollack and Baehr (1941) favoured this concept, and held that *lupus erythematosus* arose from an altered collagenous reaction to some antigen. Klinge (1930) much earlier had shown that fibrinoid changes resulted from antigen sensitivity—for example, foreign protein sensitivity. Fox in 1943 held that diffuse *lupus erythematosus* followed severe serum sickness, and Harkavy (1941) showed that periarteritis was associated with other allergies.

The following cases are selected to illustrate that fever of long standing had arisen from dental infection, and had cleared up with its removal.

S.G.W., aged forty-four years, had had persistent fever over a period of eight years. X-ray films of the chest and sinuses and various blood agglutination tests had all given negative results. The patient was ambulant and not very ill. Examination showed him to have a temperature of 99·8° F. The only other finding was a tender molar in the upper left maxilla. Blood examination showed a count of 8300 leucocytes per cubic millimetre, of which 78% were of polymorphonuclear type and 3% eosinophile cells. Dental X-ray films revealed a queer metal cap embedded in the incisor region surrounded by an area of rarefaction. The incisors had been extracted some ten years previously. Some two months after the first date of observation the molar under suspicion suppurated, and this precipitated his decision to deal with the dental sepsis in general.

At operation the remnants of a rusted hypodermic needle were removed from the incisor area and the suppurating molar was also drained and extracted later. His temperature settled within some ten days, and when he reported some two years later there had been no further febrile episodes. All tests including blood counts *et cetera* then gave normal results.

Mr. P., aged forty-two years, had had a "swinging" temperature and obscure fever for five weeks. Over the previous few years he had suffered recurrent febrile episodes associated with muscular and rheumatic pains. The present illness began in this way, and indeed he thought it would pass off in the usual two or three days. After a few days' rest he returned to work, only to relapse with a more serious infection. In the fifth week of the latter he developed frank pericarditis with muscular and joint swellings. The picture was that of a rheumatic syndrome not responding to the usual rheumatic remedies and with an unusual insidious onset. Anæmia was also present (hæmoglobin value 57%, leucocyte count 11,200 per cubic millimetre). Most of his teeth carried metal crowns and radiologically these showed gross infection. Gingivitis was extreme.

When he was first examined five weeks after the onset, his condition was extremely grave; but he responded to immediate supportive measures (blood and serum transfusions *et cetera*), and after a further four weeks the temperature subsided. At this point he still suffered some joint swellings, and it was decided to extract his grossly infected teeth under cover of sulphonamide therapy. Culture from the teeth revealed a uniformly pure culture of *Streptococcus viridans* and a vaccine was prepared and given him.

The patient has been examined annually for the past five years, and there have been no further febrile or rheumatic episodes and he remains well. He is able to play strenuous sport without disability and with no permanent stigma of heart abnormality.

The syndrome described here, of a patient with previous recurrent minor febrile episodes suffering an attack which results in prolonged fever and joint swellings, is sufficiently characteristic to be clearly recognizable and related to gross dental infection.

Respiratory Syndromes.

Mr. M.J., aged seventy-four years, was first examined some four weeks after a pneumonitic infection not responding to the usual antibiotic therapy. In spite of the fever and the lung infection the patient seemed comfortable. Examination of the patient revealed that in addition to the pneumonitis there were some foul, grossly infected teeth, and the view was held that these may have caused the persistence of the infection. In spite of intensive antibiotic therapy, and even after bronchoscopy (to overcome atelectatic factors), his raised temperature persisted until dental extraction was carried out. It then settled down rapidly.

Chest Pain, Myositis and Fibrositis, Often Simulating Angina.

Mr. N.Z., aged forty-nine years, presented with pain in the chest of anginal character. Examination of the patient revealed no cardio-vascular stigmata, but there was gross dental infection (metal crowns) and a tender spot in the mid-precordial area and over the costo-chondral junctions of the third and fourth ribs. (This is not an uncommon site of tenderness and could be perhaps given the name of costo-chondritis.) Dental extraction was advised, and when the patient was examined some two years later there had been no further pain episode.

A male subject, aged fifty-nine years, having suffered previous attacks of so-called "anginal" pain for many years, reproduced the febrile syndrome described in the preceding case. Extraction of two infected molar teeth, the infection being latent and previously unrecognized, resulted in clearing up of the condition, and the patient remains well and free of pain two years later.

The question may well be asked: Can true angina and coronary thrombosis derive from dental infection with resultant arteritis?

Pyelonephritis.

In the pyelonephritis group, pus cells are found in the urine, there is a history of recurrent so-called pyelitis, and dental sepsis is present. The last-mentioned is frequently overlooked or ignored, as it has been present for so long. When the possibility of pregnancy exists, the condition may flare into a serious disease, so that dental sepsis should always be considered in cases of obscure pyuria.

R.S., aged fifty years, had had recurrent lumbago for many years and bronchitis, and now had right-sided abdominal pain, for which, in spite of negative cholecystographic findings, cholecystectomy was about to be performed. Gross dental infection and pyuria were present. Dental extraction was advised as the first and immediate need. After this, over a period of ten years, no further pains or pyuria were noted and the patient remained well.

Bacterial Endocarditis.

Bacterial endocarditis is now so clearly related to dental infection that it requires no special comment. However, one important feature that may be overlooked is the history relating to a dental episode.

Mrs. L.K., aged fifty-eight years, presented with mitral stenosis of long standing, and recent vertigo. Special neurological examination revealed no nervous lesions, but a persistent elevation of temperature was noted, and there was some splenic enlargement. Only after careful direct questioning did she reveal that just prior to the onset of the vertigo a dental abscess had occurred necessitating dental extraction.

It should be noted at this stage that the criteria for early diagnosis of bacterial endocarditis should be reviewed. In the presence of a heart valve lesion—congenital or acquired—infected teeth make the possibility of such a diagnosis very real. Should there be a persistent rise of temperature with this, then the case is one of bacterial endocarditis until another cause for the fever is found. To wait for splenic enlargement and for petechial and embolic changes is to wait too long. Blood culture may give negative results on frequent repetition, and it is often impracticable to make a large number of such tests repeatedly.

Some Anomalous Cases of Jaundice.

Mr. L.R., aged fifty-three years, had suffered an attack of acute hepatitis with jaundice. He had a large number of crowned and infected teeth. He disregarded advice that these should be extracted, and some three years later while in Sydney (in the interim having been in moderately good health with fibrositic episodes and some dyspepsia) he developed an illness with liver enlargement and high fever. This lasted five weeks, during which he was extremely ill. The fever finally abated and no apparent cause could be found for the episode; he returned to Melbourne some four weeks later with a note that he had suffered from an obscure fever. At this time examination again revealed his infected teeth, and only when asked had they given any recent trouble did he volunteer the information that three days prior to the recent illness in Sydney he had developed a severe dental abscess, which had drained for four days, but which did not prevent him from travelling to Sydney. An X-ray report on the teeth two months after the above-described illness was as follows: "A large apical abscess in relationship to the root of the lower right first bicuspid. There is considerable alveolar absorption of an active type in right lower cuspid and incisors." Clinical examination revealed also gross gingival infection. This time he accepted the advice that dental extraction be performed, and since then over a period of three years he has remained well.

Here, then, is a patient who underwent a severe febrile episode of great danger, and whose preceding dental suppuration had been entirely ignored. It could be said that there was no relationship between this and the subsequent fever and liver enlargement. However, the fact that subsequent examination revealed a still active dental abscess, the relationship to the earlier drained abscess, the recurrent febrile episodes and the complete clearing up after total extraction, all seem to signify that here we had a dental cause for the whole condition.

Mr. K., aged thirty-two years, presented with an anomalous picture of mixed hepatitis and obstructive jaundice. At the onset there was a positive result to the flocculation test, and a diagnosis of cholangitis with hepatic infection probably due to a stone was made. There was, however, extreme dental apical infection, with multiple radiolucent areas, and it was decided to extract the teeth because these presented an additional operative hazard. Within twenty-four hours of dental extraction he showed such remarkable symptomatic improvement (flocculation test results rapidly became negative, alkaline phosphatase content reduced from 51 to 22 units) that he was allowed home under observation. However, after a period of two months jaundice recurred, and operation was then performed and a stone was revealed.

This case is presented to indicate objectively that after the dental extraction there followed immediate improvement in the flocculation test result, *et cetera*, and that in spite of evidence of obstruction the dental infection seemed to play some part in the condition; if this had remained untouched it might have made the ultimate post-operative state much more hazardous. No claim is made that at any time were the teeth to be regarded as the whole or even the major cause of the condition. Antibiotics had been given prior to dental extraction with no significant effect.

Miscellaneous Cases.

Over a period of five months two cases of pemphigus were encountered. In each, dental infection of gross type was present, and in each case immediately after dental extraction there occurred a change from local oral to general manifestations involving the whole of the skin. Clearly no claim is made that dental infection was the cause of the condition; it is possible, however, that pemphigus falls into the category of infection with a special skin reaction, the origin of which may be any gross source of infection. In these two cases, in view of the immediate "flare" on dental extraction, the teeth may well have been the source of the condition.

Discussion.

Present evidence indicates that health is a state of balance and disease an upset of that balance. This behoves us to look to all the factors capable of producing imbalance and thereby contributing to a disease syndrome.

Infection may set up a series of reactive changes, in which there are many common features irrespective of the causative factor. When an infection has been present for years there will have been a period of adaptation and therefore a vastly different reaction from the dramatic effects produced by an entirely new and active invader. This state of affairs, in which a patient lives almost symbiotically with a mouth infection, is common, and the manifestations of such infection are therefore intermittent and vague. The illness usually begins insidiously and develops slowly, there is a previous history of recurrent minor similar episodes, and as the story unfolds we note that in the present more severe incident the patient's resistance has changed. No direct connexion may be found between the focus and the disease at a distance, because the soil has changed and the patient reacts differently to an old invader. This should not exonerate the invader.

Oral infection must therefore be dealt with, the dental problem being brought into line with present-day concepts, in which we recognize that both the soil and the seed contribute to the disturbance of balance called disease. The cases quoted here of good tolerance to fever support this view. Dental infection, being painless, is allowed to remain, and so the physician frequently misses a major opportunity to deal with this cause of disturbance of health.

In 1948 a Joint Medico-Dental Relationship Committee (1948) stated that the general trends indicated emphatically the need for a broader biological viewpoint in dental procedure, and plainly pointed the need to attend the whole man. Medico-dental problems are interrelated, and the dentists must possess sufficient knowledge of medicine to "appraise their patient's abnormalities, to detect disease where oral manifestations are seen early, and to broaden the scope of their subject to include cardiology, nutrition, etc.".

"Plainly", the committee report concluded, "a better integration and use of the basic sciences in clinical medi-

cine and dentistry are destined to illuminate the way toward the discovery of biological secrets as yet undisclosed." To this, one could add the comment that to deny the relationship of focal infection to systemic diseases is to turn the clock back and ignore the evidence of present-day knowledge.

Summary.

1. A survey is made of the newer concepts of disease wherein the soil as well as the seed must be considered.

2. It is held that rheumatic fever, as one example of a recurrent focal infection producing a change in soil, offers a serious challenge to Koch's postulates of infection as a cause of disease.

3. Evidence is produced to show that much proof exists of the transference of organisms, dyes and toxins from a single source of infection to other parts.

4. Clinical evidence supports the view that focal infection may produce systemic effects. Typical of the focal syndrome is the better tolerance in the early stages of the disease and the tendency to frequent recurrences of a similar nature. No cure is possible until the focus is removed.

5. A plea is made for closer medico-dental cooperation. Both professions have a part to play in the adjustment of a patient to external stresses.

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"OUT OF FOCUS"—MEDICINE OR DENTISTRY?

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MORE than twenty years ago Lord Horder defined "focal sepsis" as the term used to signify the presence of a local and chronic infection, itself yielding few or no symptoms, yet resulting in a state of toxæmia, with or without mild bacteriæmia, and leading to a number of general or remote disturbances. The clinical significance of focal infection is still recognized in most English-speaking medical and dental schools, but there are some teachers and physicians who minimize its importance and decry its lack of complete scientific proof.

I think I can safely say that the vast majority of the dental profession in Victoria subscribe to the general principles of the theory of focal infection. What is the general belief of the Victorian medical profession? I ask the question knowing that in at least one other State opinions are far from unanimous.

An eminent bacteriologist, Professor H. K. Ward of Sydney, has made the following statement (1948):

> If one stands back for a moment and surveys the scheme of modern medicine and dentistry, one sees how very, very common removal therapy has become—tonsillectomy, appendicectomy, and necrodontectomy add up to the majority of all operations performed, and I venture to say that most of these operations are unnecessary, based on faith and not on reason and evidence. No one would take exception to the removal of a tonsil, an appendix, or a dead tooth because of persistent local pain, but to remove them in the hope of curing systemic diseases is something else again, and is merely clutching at a straw. These operations are the more popular because the operation mortality is not high, although the risk cannot be disregarded.

On the other hand, Dr. W. P. Murphy (1936), one of the co-discoverers of liver therapy in pernicious anæmia, is reported as saying:

> If we may then accept as a present concept, and I believe we may, that foci of infection occur commonly, that they may at times play an important ætiological role in the production of disease, and that they are important implications in association with many chronic illnesses, then I believe that we as physicians and dentists have several important problems to solve in the practical care of our patients.

These are two opposed views given by members of the medical profession; one or other must be out of focus.

The mouth and nose together represent the portal of entry to both the respiratory and alimentary systems, and it is hardly conceivable that mouth diseases cannot at least have some effect on other parts of the body. Whether this effect is on contiguous parts only (antrum, nose, eye) or on more distant organs, whether it is transitory or permanent, significant or insignificant, are matters which medical science must determine on facts and clinical experience. Mr. J. H. Doggart (1951), surgeon to Moorfields Eye Hospital, London, gives an oculist's opinion:

> Most ophthalmologists consider that the paranasal sinuses not only influence the eyes and ocular adnexa through contiguity, but should also be regarded as ætiologically important in various forms of keratitis and uveitis. The same attitude is even more widely upheld concerning the teeth, which also belong to the skeletal system. Naturally, it is agreed that dental and sinus infection worthy of treatment as such, should receive attention without delay, but many will criticise the extreme devotees of focal sepsis. There have been adherents so fanatical that they sailed into the sphenoidal sinus or indiscriminately slaughtered all the teeth in the absence of any good reason for blaming these structures.

Why Should the Dentist and Not the Physician be the Final Arbiter in Assessing Oral Foci of Infection?

Dentistry has long since ceased to be merely manipulative, technical, and restricted—it has now broadened into the large field of dental science which is part of the general health service of the community. Such being the case, dental teachers have regarded it a duty to see that their students are educated in the basic principles of medicine and surgery, in order that they may more adequately assess the effects of mouth sepsis. I trust I shall not be considered unduly provocative if I say that our dental students know much more about medicine than medical students know about dentistry; yet it is a curious fact that many patients are still submitted to extensive dental operations, more on the advice of their medical practitioner than of their dentist. Such being the case, is it not fair to ask why medical students are not given a basic knowledge of oral pathology and dental diseases? If you agree that they should be, then the next question is:

[1] Read at a meeting of the Victorian Branch of the British Medical Association on June 6, 1951.

What Common Dental Diseases are of Importance to the General Medical Practitioner?

Pathological conditions associated directly with the teeth and their supporting structures have been classified as those producing so-called "closed sepsis" and those typifying "open sepsis".

The "closed sepsis" group includes late effects of dental caries — periapical granuloma, dental cyst (usually infected), chronic periapical abscess (rare).

The "open sepsis" group includes diseases of the gums and peridental membrane—acute periapical abscess (draining through the peridental membrane or alveolar process), generalized gingivitis (hypertrophic or atrophic), *pyorrhœa gingivæ* in its various forms, Vincent's infection.

What is the Significance of Dental Caries?

So long as this disease is restricted to the hard tissues of the tooth and does not involve the pulp, it has only local significance. If the pulp is exposed by the carious process and succumbs to the infection, the tooth is designated clinically as "dead". The infection may remain temporarily quiescent in the pulp canal for a varying period, or the bacteria and/or their products may pass into the periapical bone. According to the type of infection and the local resistance, so will there develop an acute periapical abscess, a chronic periapical abscess, a granuloma, or a dental cyst.

What is the Medical Significance of Dental Granulomata, Cysts and Chronic Abscesses?

A periapical granuloma represents a chronic low-grade infective reaction in the alveolar bone; it is a mass of chronic inflammatory granulation tissue. If the centre of this mass breaks down and the cavity so formed is lined with epithelium (from rests of Malassez), then a dental cyst is formed. In the rarer condition of chronic dental abscess, the organisms have passed out of the pulp canal and have caused a breakdown of the original chronic inflammatory lesion in the alveolar bone, with the formation of pus. In all three instances, bacteria and their products are normally confined to the periapical area by the cells called up as the result of the inflammatory reaction. A limiting wall of fibrous tissues may be built up, but this does not prevent direct connexion with the blood-stream via blood vessels and lymphatics. Thus there is always the possibility of bacteria or their products escaping periodically and entering the blood-stream. This may happen when there is an exacerbation of the infection in the diseased pulp, or when hard food is pressed into an exposed canal, or when the tooth is rocked and rotated during extraction.

If bacteria do enter the blood-stream in this way, before they reach the liver or spleen where they will be destroyed they may lodge in some situation where they can establish themselves and multiply. In "post-rheumatic" cases, for example, bacteria may lodge on vegetations on the heart valves, producing subacute bacterial endocarditis. This, as you know, is of particular importance in children, and the dental treatment of such children with chronic dental abscesses calls for great care. Since nothing can prevent a probable "bacterial shower" into the blood-stream during extraction of the tooth, the time of dental operation must be carefully selected, the operative field must be carefully prepared, and an adequate penicillin cover must be given.

What is the Importance of Generalized Gingivitis, Pyorrhœa, and Vincent's Infection?

In order to answer this question we must have an appreciation of the "normal" mouth, and of the histopathology of gingival tissues. It was formerly held that "closed" dental sepsis was the more dangerous to the patient, but we now know that the "open" type, which includes diseases of the gum and peridental membrane, is of more serious import.

Under ordinary day-to-day conditions the risk of escape of organisms into the blood-stream from an apical lesion is not so great as from a pyorrhœal pocket. An apical granuloma is less liable to mechanical interference unless the tooth is loose or the pulp canal open, while a pyorrhœal ulcer is subject to constant trauma during mastication.

If a tooth badly affected by pyorrhœa is extracted, the pumping and sucking action consequent upon the use of the forceps must force streptococci of the ulcer down the peridental membrane. Some of these may be even sucked back into the pulp through the apical foramen during the necessary rocking and rotation of the tooth, but the majority pass directly into the blood-stream in the form of a "bacterial shower". You will remember that this "bacterial shower" was investigated by Okell and Elliott (1935), who found that transient bacteriæmia was present after most dental extractions. It lasted only a few minutes, until the leucocytes and cells of the reticuloendothelial system rounded up the organisms and disposed of them. Other workers (Round, Kirkpatrick and Hails, 1936) also proved that a "bacterial shower" could occur when patients with well-established *pyorrhœa gingivæ* merely ground their teeth together during mastication of hard foodstuffs. There is now no question of the fact that subacute bacterial endocarditis can be produced by this mechanism (E. W. Fish, 1944).

It is rather amazing, therefore, that serious sequelæ that may follow dental operations in unclean mouths are not more numerous. One of the reasons may be that the head and neck have a relatively large blood supply. As a student I was privileged to attend lectures in surgery by Dr. Fay Maclure, and one of his sayings of those prepenicillin days remained indelibly in my memory: "The relatively large blood supply of the head and neck has kept many a dentist out of a coroner's court." I always had a wistful feeling that it was rather unfair to specify only dental operations in this regard, because, as only one other example, ear, nose and throat surgery may be equally dependent upon the relatively large blood supply of the operative area for its comparative immunity from embarrassing sequelæ.

Vincent's Infection.

Vincent's infection of the mouth varies from the smouldering, almost painless, chronic lesion in the mouth of a heavy cigarette smoker, to extensive destruction of the interdental gum tissues with exposure of the alveolar bone. It never occurs in an edentulous mouth with intact mucous membrane. It was not known as a clinical entity before the first world war, and the term "trench mouth" was coined because of its occurrence in men who had served for long periods in the trenches. Carriers are well known, and although there is abundant clinical evidence to prove the spread of contagion, it must be admitted that so far all experimental attempts to transfer the disease from infected human mouths to healthy human mouths have failed. We know quite a lot about its bacteriology, but certainly not enough about its epidemiology.

Bacteriological examinations of most mouths, from adolescence onwards, will demonstrate fusiform bacilli and spirochætes in varying numbers and in varying proportions of bacilli to spirochætes. It must be stressed that quite a number of types of spirochætes are found in the mouth, and also that there are many short thread forms which may simulate *Borellia vincenti*. However, the two specific organisms demonstrate a classical example of symbiosis in producing the disease; in the average mouth they are nothing more than loosely related saprophytes, but with the occurrence of ecological changes and what I believe to be the provision of some "X factor" they join forces in earnest and become pathogenic. Not infrequently they are present in a state of low-grade virulence in cases of chronic gingivitis.

They are notorious for producing a smouldering infection under the soft-tissue flap which covers part of the crown of an impacted wisdom tooth. If such a tooth is removed without previous prophylactic local treatment, the condition lights up and becomes an acute and fulminating infection of the bone and soft tissues, and general toxæmia ensues.

There is abundant clinical proof that chronic Vincent's infection of the gingival tissues can produce toxæmia able to bring about systemic effects varying from neurasthenia to semi-invalidism.

Is there Any Relation Between Mouth Sepsis and Post-Anæsthetic Respiratory Sequelæ?

Respiratory complications following dental operations have decreased greatly during the last decade. This has been largely due to the more common use of continuous anæsthesia, to improved techniques for packing off the operative field in mouth operations, and to the institution of post-operative "stir-up" treatment in the wards. These techniques attempt to prevent the mass transference of oral bacteria in ready-made culture media (blood, saliva, sordes, mucus) into the respiratory tree, or to expel them if by chance they have arrived there.

That mouth organisms can have a direct relation to respiratory diseases has been proved by E. E. Glynn (1923) and N. E. Heath (1937), and it is well known that the organisms of Vincent's infection are present, probably as secondary invaders, in bronchiectasis and lung abscess.

I venture to suggest that in the average hospital ward at least 25% of the patients possessing natural teeth have a grade of mouth sepsis which, *per se*, is capable of initiating or contributing to some form of post-operative respiratory complication. That such a causal relationship cannot be precisely determined is no argument for ignoring the fact the pathogenic oral bacteria can pass down the respiratory tree during anæsthesia. In their new environment, ecological changes may increase virulence, and even potential pathogens may be turned into active pathogenic organisms (A. B. P. Amies, 1945).

Is it unreasonable to suggest that except in cases of emergency surgery, every patient should undergo thorough oral prophylaxis prior to general anæsthesia—especially if an anæsthetic such as "open ether" is administered?

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THE BACTERIOLOGY OF CONJUNCTIVITIS IN QUEENSLAND.

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THE commonly accepted description of the bacteriology of conjunctivitis refers to that obtaining in places outside Australia. It is very difficult to find any reference to the subject in Australian medical literature, and I could find no account of the bacteriology of conjunctivitis in Queensland or other parts of Australia with a similar climate. It is interesting therefore to compare the usual text-book account of the subject with the clinical and bacteriological findings in a series of 230 patients with conjunctivitis whom I have treated at the Eye Out-Patient Department of the Brisbane General Hospital and the Brisbane Children's Hospital during the last three years. This was a series of cases of acute or subacute conjunctivitis with varying amounts of discharge. Chronic conditions such as spring catarrh or trachoma are excluded; but it may be worth mentioning that some years ago, during an investigation of trachoma in western Queensland, I found typical inclusion bodies in material from seven out of 35 trachematous children (mostly in the early stages of trachoma), and no inclusion bodies in conjunctival scrapings from the upper palpebral conjunctiva of a similar number of control children with healthy conjunctival sacs. As was to be expected in a specific form of conjunctivitis, these results agree with those found elsewhere (Julianelle, 1938); but there is a pronounced difference when we come to study the bacteriological findings in acute or subacute conjunctivitis, with which we are concerned in this article.

Bacteriology of Normal Conjunctival Sacs.

Let us first examine the findings with respect to normal conjunctival sacs, which contain a wide range of organisms. The first five columns of Table I are taken from Duke-Elder's "Text-book of Ophthalmology" (1939), while the last column shows the findings in 1000 clinically healthy conjunctival sacs of patients being examined pre-operatively in the Brisbane General Hospital, during the same period of time as the cases recorded in Table II.

It will be seen that the diplobacillus of Morax-Axenfeld, to give it its usual name, was found in as much as 22% of normal conjunctival sacs in other countries, and that the pneumococcus occurred in up to 41% of normal sacs. No diplobacillus and no pneumococci were found in the Brisbane Hospital series. The commonest organisms were the staphylococcus and the diphtheroid bacillus (*Bacillus xerosis*). About one-fifth of the staphylococci found were coagulase-positive.

Proteus (2·5%) and *Pseudomonas pyocyanea* (3·0%) had a higher incidence than is usually given (both are stated to be rarely found in the conjunctiva—Duke-Elder, 1939). An interesting feature was the manner in which the flora of these clinically healthy sacs altered whilst the patient was being treated pre-operatively for some potentially pathogenic organism.

Bacteriology of Conjunctivitis.

Turning now to the bacteriology of acute and subacute conjunctivitis, we again find an entirely different picture in Brisbane as compared with the usual text-book description. The first four columns of Table II show the incidence of organisms found in smears from conjunctivitis subjects in other countries (Duke-Elder, 1939), while the last column shows the findings in a series of 230 patients whom I have treated at the Brisbane General Hospital and the Brisbane Children's Hospital during the last three years. In all cases smears and blood-agar cultures were prepared, and in the last 20 cases of the series Fildes medium was also used in a search for the hæmophilus. The striking difference in the incidence of the hæmophilus group (Koch-Weeks bacillus and the diplobacillus of Morax-Axenfeld both belong to the hæmophilus group) elsewhere as compared with the Brisbane Hospital series is obvious. A summary of the first four columns shows that the hæmophilus group accounts for 66% of all cases and 85% of all positive findings in other countries. The diplobacillus of Morax-Axenfeld alone accounts for 40% of all cases and 50% of all cases in which positive findings are obtained on examination of smears. On the other hand, in the Brisbane Hospital series there were only three cases (1%) in which Koch-Weeks bacillus was present, and in no cases was the diplobacillus of Morax-Axenfeld found. Another striking feature is the relatively high incidence of streptococci and staphylococci (coagulase-positive) in the Brisbane cases.

Table III sets out the correlation between the bacteriological findings in the Brisbane series and the corresponding clinical picture. In the third column are recorded any unusual clinical features such as subconjunctival ecchymoses. The first 80 patients were treated with irrigations, sulphacetamide drops (30%), and sulphacetamide ointment (10%), while the last 150 patients were given penicillin drops and penicillin ointment.

TABLE I.

Common Organisms Found in Normal Conjunctival Sacs.

Organism.	Heindorff, 1898.	Orten, 1899.	Rymowicz, 1901.	Pillat, 1922.	V. Pellathy, 1932.	Brisbane Hospital, 1948–1950.
Bacillus xerosis (diphtheroid bacillus)	83%	57·5%	94%	100%	51%	30%
Staphylococcus	85%	96·2%	87%	94%	68%	62%
Pneumococcus	5%	4%	9%	41%	18%	—
Hæmophilus lacunatus (Morax-Axenfeld bacillus)	—	—	6%	22%	9·5%	—

Most of the patients were examined a few days after the onset of the conjunctivitis. In most cases the condition took about one week to clear up on the treatment prescribed. When it did not improve sufficiently within ten days the lids were painted with 2% silver nitrate solution. The course of the conjunctivitis was much the same whether sulphacetamide or penicillin was used, but penicillin was rather more effective. No specific clinical features were associated with any of the organisms found in the smears or cultures. For example, subconjunctival ecchymoses and chemosis, which are said to be characteristic of pneumococcal conjunctivitis, were found in association with a number of different bacteria, and also occurred in cases in which no growth was obtained on attempted culture. In the two cases in which *Pseudomonas pyocyanea* was the infecting organism, panophthalmitis developed.

TABLE II.

Incidence of Various Organisms in Cases of Conjunctivitis.

Organism Found.	Pollock (1905), 361 Cases.	Geiss (1907), 900 Cases.	Usher and Fraser (1906), 820 Cases.	Morax and Auge (1906), 692 Cases.	Brisbane Hospital (1948-1950) 230 Cases.
Diplobacillus	62	519	274	253	Nil
Koch - Weeks bacillus	189	41	310	175	3
Pneumococcus	9	34	24	18	16
Gonococcus	17	12	18	121	Nil
Diphtheria bacillus	—	6	1	2	Nil
Staphylococcus	13	1	37[1]	6	115 (Coagulase-positive, 65; coagulase-negative, 50)
Streptococcus	2	5	—	—	24
Pneumobacillus	—	2	—	—	Nil
Influenza bacillus	—	3	—	6	Nil
Negative or uncertain findings	62	278	77	106	90

[1] Staphylococcus and streptococcus.

Table IV sets out the observations of J. Bruce Hamilton (1942) in an eight-year (1931 to 1939) survey of eye diseases in Tasmania. Omitting allergic conjunctivitis and *ophthalmia neonatorum*, which were not included in the Brisbane results, we again find a high incidence of the hæmophilus group.

The bacteriological findings in the cases of angular conjunctivitis are not given; but if we assume the specific diplobacillus to be present in the 39 cases of angular conjunctivitis, the bacteriology in this series corresponds with the findings quoted by Duke-Elder, possibly because of the similarity of the Tasmanian climate to that of the countries in which these findings were recorded. However, temperature alone will not account for the difference, since Morax-Axenfeld infection of the conjunctiva is an extremely common condition in Egypt and the organism may be found in as many as 40% to 50% of the conjunctivæ of the people (Wilson, 1932). MacCallan (1936) found the diplobacillus in 34% and Koch-Weeks bacillus in 16·6% of normal conjunctival sacs in Egypt.

Bacteriological Findings in Conjunctival Scrapings.

In a series of 42 cases of conjunctivitis, smears and epithelial scrapings (from the upper palpebral conjunctiva) were taken. Dr. E. H. Derrick, Deputy-Director of the Queensland Institute of Medical Research, kindly gave much of his time to examining and reporting on the slides of this series. The findings were as follows: (i) No inclusion bodies were found in the epithelial scrapings. (ii) In almost every case polymorphonuclear cells were predominant. When lymphocytes were predominant there was no obvious clinical reason for this. (iii) The only organisms seen were diplococci resembling pneumococci. (iv) In a number of cases the cytoplasm of the epithelial cells contained fragments of nuclear material.

TABLE III.

Correlation Between Bacteriological Findings and Clinical Features in 230 Cases of Conjunctivitis (1948–1950).

Organism.	Number of Cases Found.	Unusual Clinical Features.
None (or diphtheroids)	90	Severe discharge, four cases; chemosis, one case; subconjunctival hæmorrhages, one case.
Staphylococcus, coagulase-positive.	65	Severe discharge, three cases; chemosis, two cases; subconjunctival hæmorrhages, two cases.
Staphylococcus, coagulase-negative.	50	Severe discharge, two cases.
Streptococcus (chiefly hæmolytic).	24	Severe discharge, two cases; chemosis, two cases; subconjunctival hæmorrhages, two cases.
Pneumococcus (alone or with staphylococci).	16	Severe discharge, two cases.
Koch-Weeks bacillus	3	Acute dacryocystitis, one case.
Pseudomonas pyocyanea	2	Panophthalmitis developed in both cases.
Neisseria	2	Non-pathogenic in one case: profuse discharge and chemosis in the other.
Coliform bacillus	2	Nil.

TABLE IV.

Bacteriology of Acute Conjunctivitis in Tasmania (J. Bruce Hamilton).[1]

Organism.	Number of Cases.
Bacillus, unknown	90
Staphylococcus and streptococcus	7
Pneumococcus	9
Koch-Weeks bacillus	9

[1] Angular conjunctivitis was present in 39 cases.

Clinically one sees numerous patients with angular hyperæmia of the bulbar conjunctiva; but this, no doubt, is a vascular reaction from exposure to dust, wind and glare. In view of the fact that the diplobacillus of Morax-Axenfeld was not found in any normal eyes or in any eye with an appearance suggestive of angular conjunctivitis, it is questionable whether this specific form of conjunctivitis occurs at all in Queensland. The Koch-Weeks bacillus was found in only three cases of conjunctivitis. Clinically, of

course, the Koch-Weeks bacillus does not give rise to a specific type of conjunctivitis.

With regard to treatment, in view of the high incidence of organisms susceptible to penicillin and sulphonamide drugs—that is, staphylococci, streptococci and pneumococci—it is not surprising that sulphacetamide and more especially penicillin gave good clinical results.

Summary.

1. The bacteriology of the conjunctiva in Queensland is compared with the findings in other places.

2. The diplobacillus of Morax-Axenfeld, which is an extremely common inhabitant of the conjunctival sac elsewhere, was not found in any of 1000 healthy conjunctival sacs in Queensland.

3. The hæmophilus group had a very low incidence in 230 cases of acute or subacute conjunctivitis in Brisbane. The diplobacillus of Morax-Axenfeld did not occur at all, in contrast with its high incidence (about 40%) elsewhere, and Koch-Weeks bacillus was found in only 1% of cases.

4. Temperature alone will not account for the pronounced difference, since the hæmophilus group, especially the diplobacillus, has a high incidence in Egypt.

5. Clinically and bacteriologically it is doubtful whether angular conjunctivitis, the specific cause of which is the Morax-Axenfeld diplobacillus, exists in Queensland.

6. No inclusion bodies were found in conjunctival scrapings from a series of 42 cases of acute conjunctivitis.

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GONIOTOMY FOR CONGENITAL GLAUCOMA: A REVIEW WITH REPORT OF THREE CASES.[1]

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GLAUCOMA occurring in patients younger than thirty years of age is arbitrarily classified as juvenile glaucoma unless the patient is so young that the ocular tissues undergo enlargement as a result of increased intraocular pressure. Then the disease is called congenital or infantile glaucoma (Scheie, 1950*b*; Anderson, 1939).

Goniotomy is an operation for stripping or peeling embryonic tissue from the wall of the angle. The mode of action of goniotomy consists in restoring access of aqueous to Schlemm's canal by removal of obstructing tissue (Barkan, 1949*b*).

Anderson (1939) has shown that Schlemm's canal was present in 75% of the earliest specimens of eyes not subjected to operation which were examined, and no sign of it was found in more than half the patients aged over two and a half years. He suggests that the canal becomes closed in the later stages as a result of distension of the eyeball and of increased intraocular pressure. It is essential, therefore, to operate early before Schlemm's canal has become obliterated by prolonged distension. Other important reasons for early diagnosis and prompt operation are the following: (i) restoration of vision by clearing of the cornea, corneal cloudiness being largely reversible in the early stages; (ii) prevention of amblyopia due to prolonged obstruction of vision by cloudiness of the cornea; (iii) prevention of development of permanent scar formation from corneal cloudiness; (iv) prevention of injury to the optic nerve by prolonged pressure (Barkan, 1949*b*).

In 1892 De Vincentis (Anderson, 1939) incised the angle of the anterior chamber for the treatment of congenital glaucoma, and several Italian and French ophthalmic surgeons have since used the operation. In 1942 Barkan first reported the results of operation which he had performed on 17 eyes, with normalization of tension in 16 eyes and maintenance of vision in 14 eyes. By 1949 he was able to report his results in operations on 76 eyes with normalization of pressure in 66 eyes (Barkan, 1949*b*). Barkan's patients had been followed from three months to ten years. He considers the operation successful if the tension does not rise higher than 21 millimetres of mercury with a Schiötz tonometer, no miotics having been used during the two weeks preceding measurement of the tension. Scheie (1949) has reported 11 successes out of 14 eyes treated, the patients having been followed for two years or more. McArevey (1950) operated on 25 eyes and obtained normalization of pressure in 21 eyes. These three workers combined have operated upon 115 eyes with success in 98.

Goniotomy is indicated in all cases of congenital glaucoma in which the increased intraocular pressure is the result of obstruction of the angle by persistent embryonic tissue, provided that Schlemm's canal has not been obliterated by, and degenerative changes have not resulted from, prolonged distension of the globe. It is contraindicated for older children whose eyes are in an advanced stage of glaucoma, with corneal scarring, cloudiness and a corneal diameter of 15 millimetres or more (Barkan, 1949*b*).

With reference to the technique of goniotomy, Barkan (1949*b*) describes the operation according to whether or not a surgical contact lens is used. If the cornea is clear he performs the operation under direct vision using the lens, and if it is cloudy the operation is performed without the lens.

In 20 eyes operated upon by the use of the contact lens the operation was successful, whereas of 56 eyes operated upon without the contact lens reoperation was necessary on 18 eyes. Scheie (1949), on the other hand, operated without the contact lens, holding that it is cumbersome and that contact with the cornea is difficult to maintain. McArevey (1950) also operated without the contact lens.

Briefly, Barkan's technique is as follows. Using the contact lens, the operator stands at the 11 o'clock position for the right eye and at the 4 o'clock position for the left eye. The eye is fixed by an assistant three to four millimetres posterior to the corneo-scleral border at the 12 o'clock and 6 o'clock positions or at the insertions of the vertical muscles. During operation on the right eye the assistant holds the forceps at the 12 o'clock position with the right hand and the forceps at the 6 o'clock position with the left hand. The hands are reversed during operation on the left eye. The surgeon steadies the glass with the index finger of his left hand. The illuminator stands on the right of the surgeon and he maintains the lamp in contact with the temple of the surgeon, at the same time looking down the top of the shaft of the lamp. The eye is rotated two hours counterclockwise and puncture is made at the 10 o'clock position for the right eye and at the 4 o'clock position for the left eye. The knife crosses the optic axis and engages the angle, and is moved counterclockwise as far as visibility will permit. This is usually one-quarter to one-third of the circumference. There may be a slight sensation of grating as the blade proceeds.

[1] Read at the annual general meeting of the Royal Australasian College of Surgeons, Sydney, 1951.

When stripping is completed the knife is removed and the contact glass and fixation forceps are removed. After a few seconds oozing of blood of venous colour appears in the anterior chamber along the line of the stripping. If after removal of the knife the pupil is eccentric, the cornea is tapped near the puncture with a spatula to prevent the adhesion of the iris to the inner lip of the wound. Eserine is instilled and the child is nursed on the side of operation in order that blood may settle on the opposite side of the chamber.

When the surgeon is operating without the contact glass, the illuminator stands at the 4 o'clock position for the right eye and at the 10 o'clock position for the left eye. Fixation is as for operation with the contact lens, but in addition the surgeon fixes the globe with forceps at the limbus opposite the point of puncture, which is at the 10 o'clock position for the right eye and at the 4 o'clock position for the left eye. The knife is passed across the anterior chamber and engages the angle wall. Seen through the cornea, the knife appears to be 0·5 millimetre more anterior than it really is. The surgeon must not be tempted to guide the knife more posteriorly. Stripping of the angle wall is associated with a grating sensation, and its absence is an indication that the blade is too far back. A little blood of venous colour oozes from the line of stripping. If the blood is more arterial in colour, and if the flow is more extensive and follows immediately on the incision, then the puncture has been placed farther back than is desirable. Blood is usually absorbed in twenty-four to forty-eight hours.

Scheie (1950*a*) believes that an important part of the operation is post-operative filling of the anterior chamber with saline. Before passing the goniotomy knife into the chamber he passes a fine knife needle obliquely in the upper temporal part of the cornea, and after operation passes a fine needle into this track and injects saline. He does not inject saline through the goniotomy puncture wound, as he considers it not oblique enough to act as a valve. In addition he recommends that one-third to one-half of the angle be stripped, and he is of the opinion that by so doing the number of reoperations is reduced. Barkan strips only one-fifth to one-third of the angle, stating that further operation can be performed.

The source of light is important. Barkan has designed a hammer lamp which is light and air-cooled and gives brilliant illumination. He has operated under floodlamp for the purpose of making cinematographic films, but he considers his own lamp superior (Barkan, 1949*a*). The goniotomy knife is of special design, as is the surgical contact glass (Barkan, 1950*c*).

The dangers of operation are excessive hæmorrhage, injury to the ciliary body and subluxation of the lens.

It may be suggested that the operation is in the nature of an internal cyclodialysis. Examination of patients post-operatively with the gonioscope shows that there is no cyclodialysis (Barkan, 1949*b*). Cyclodialysis is designed to produce a cleft between the anterior chamber and the suprachorioidal space by detachment of the ciliary body from the sclera, and drainage occurs into the space so made (Barkan, 1950*b*). Although no large series has recently been reported of cases of congenital glaucoma treated by cyclodialysis, Anderson's analysis of cases of congenital glaucoma so treated up to 1939 indicated that the results were bad (Anderson, 1939). On the other hand, Scheie (1950*b*) has developed a procedure which he calls goniopuncture. This operation is performed by carrying the tip of the knife across the anterior chamber as in goniotomy, but instead of the knife being swept along the angle, a counterpuncture into the subconjunctival space is made through the trabecular region of the corneo-scleral wall. When the operation is successful, a permanent fistula is established, which permits subconjunctival drainage of aqueous humour, indicated by normalization of tension and diffuse œdema of the conjunctiva over the area adjacent to the puncture. A persistent hole usually can be seen by gonioscopic examination in the angle wall at the site of the puncture.

Reports of Cases.

CASE I.—C.D., a male child, was first examined in December, 1949, at the age of six months, when bilateral congenital glaucoma was present. The corneæ were hazy, and the tension was 40 millimetres of mercury (Schiötz) in the right eye and 50 millimetres of mercury (Schiötz) in the left eye. The corneal diameters were 12 millimetres in the right eye and 12·5 millimetres in the left eye. A corneo-scleral trephining procedure was performed in each eye. This failed to control the left eye, and one month later an iris inclusion was performed. In July, 1950, the mother reported with the child, saying that the left eye was red and watery and was kept closed. The left cornea was steamy, the conjunctiva was injected and there was gross photophobia. There were tears in Descemet's membrane and the corneal diameter was 15 millimetres. On July 17, under general anæsthesia, a goniotomy was performed on the left eye without the contact lens. There was a little hæmorrhage after withdrawal of the knife, but this had disappeared within twenty-four hours. A small iridodialysis was produced owing to over-enthusiasm; not content with a downward sweeping, I also swept the knife back, and in so doing produced the small iridodialysis. Since operation the left cornea has been bright and clear, and when the child was last examined on May 28, 1951, the cornea was bright and the corneal diameters were 12 millimetres in the right eye and 15 millimetres in the left eye. The tension was 25 millimetres of mercury (Schiötz) in each eye.

I felt that goniotomy was justified in this case, even though the corneal diameter was 15 millimetres, as two filtering operations had failed.

CASE II.—R.T., a male patient, aged sixteen years, was referred to me by Dr. Conrad Blakemore in October, 1950. When the patient was aged six years it was noted that the left eye was defective, and he was found to have a dislocated lens and glaucoma. The right eye was normal. He reported to Dr. Blakemore in September, 1950, complaining of loss of vision in the right eye over approximately twelve months.

When I examined this patient in October, 1950, visual acuity in the right eye was 6/18 with correction, and that in the left eye was reduced to perception of light in the temporal field. The tension was 60 millimetres of mercury (Schiötz) in each eye. The corneæ were clear; the diameters were 13 millimetres in the right eye and 14·5 millimetres in the left eye. The anterior chambers were of normal depth. Both disks were cupped and the left lens was dislocated. There was residual temporal field in the right eye. The lad was nervous and apprehensive, and taking of the tension was upsetting to him.

A goniotomy was performed on the right eye on November 28, 1950, with the patient under "Pentothal" anæsthesia, and without the contact lens. On removal of the knife there was oozing of blood along the area stripped. The next day this blood had been completely absorbed. When the patient was last examined on April 4, 1951, four months after operation, the corrected visual acuity in the right eye was 6/9, the tension was 28 millimetres of mercury (Schiötz) and the field was unchanged.

This was a most difficult case. The state of affairs was such that any filtering operation could not be lightly undertaken, and because of the age of the patient I was doubtful whether goniotomy would be desirable. For these reasons I sought Barkan's opinion, and as he had performed goniotomy in a similar case some three months before he advised me to proceed (Barkan, 1950). The amazing feature of this case has been the altered outlook of the patient after operation. He appears to have lost his nervousness and apprehensiveness.

CASE III.—I report this case with the permission of Dr. Norman Gregg, who invited me to assist at the goniotomies performed on this child.

A.B., a male child, aged five and a half months, was first examined on January 15, 1951, because of photophobia. The child had a mongoloid appearance. The tension in each eye was 40 millimetres of mercury (Schiötz) and the corneal diameters were 15 millimetres. On February 20 a goniotomy was performed on the right eye. After withdrawal of the knife there was hæmorrhage which filled the anterior chamber; the blood had been completely absorbed within two days.

On March 6 a goniotomy was performed on the left eye. Here again hæmorrhage occurred, which cleared promptly, but was followed by a secondary hæmorrhage due probably to the activity of the child. This cleared within one week.

On May 5 the tension was 18 millimetres of mercury (Schiötz) in the right eye and 17 millimetres of mercury (Schiötz) in the left eye. There was no cupping. There was a small anterior synechia in the right eye at the point of entry of the knife. Both corneæ were clear and there was no photophobia.

These goniotomies were performed under general anæsthesia and without the contact lens.

No difficulties were encountered in these three cases, except that when the eye was being fixed with forceps at the 12 o'clock and 6 o'clock positions the conjunctiva tended to override the limbus and obscure vision. This could be overcome by lifting the eye forward.

Summary.

1. Goniotomy for congenital glaucoma is reviewed and the technique is briefly outlined.

2. Three cases of congenital glaucoma treated by goniotomy are described.

Acknowledgement.

I desire to acknowledge my indebtedness to Dr. Otto Barkan, of San Francisco, for all the encouragement and advice he has given me over the past eighteen months through personal communications.

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RHABDOMYOSARCOMA OF SKELETAL MUSCLE.

By GEORGE C. V. THOMPSON,

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RHABDOMYOSARCOMA arising from skeletal muscle is of infrequent occurrence although constituting a very characteristic group of malignant tumours. The rarity of the condition is surprising. Willis (1948) makes the following statement:

> It is a striking fact that in spite of the vast bulk of the skeletal muscles of the body, undoubted rhabdomyosarcomatous tumours are much rarer in this than in certain special situations where normally no striated muscle is present or where the scanty muscle which is present is only doubtfully the real source of the tumours.

Rhabdomyosarcomata which are more common in other regions of the body, particularly the genito-urinary system, the heart, the upper part of the respiratory tract and the alimentary system, are outside the scope of the present discussion. Stout (1946) confined his attention to "tumours that are definitely made up of cells which, in whole or in part, have some characteristics of rhabdomyoblasts and which have arisen in the striated muscles (exclusive of heart muscle) or immediately adjacent to them"

Using this criterion to supply the material for a comprehensive review of the subject, Stout (1946) collected all published cases of rhabdomyosarcoma developing in striated muscles, to which he added 14 cases of his own. He found a total of only 121 cases as a basis for analysis. The case reported by Hirsch (1929) appears to have been missed from this review, while a second case which was reported by Hirsch (1931) as a mixed thyreoid tumour containing striated muscle fibres, but which Willis (1948) considers to be a probable rhabdomyosarcoma, should also be included in the study. The description of the latter case appears to fulfil all the criteria of a rhabdomyosarcoma. Two further cases have been reported by Childs (1949) since that time.

In an attempt to classify tumours of striated muscle, Ewing (1940), admitting the difficulty of interpreting such tumours, stated that rhabdomyosarcomata of voluntary muscle arise from adult tissues, but that some such tumours, especially in infants and children, may arise from embryonal cells. Willis (1948) emphasized the rarity of rhabdomyosarcoma of adult voluntary muscle, stressed the youth of the patients, discussed the origin of the tumours from immature embryonic myoblasts, and reached the conclusion that the usual source of rhabdomyomatous tumours is not adult muscular tissue, but embryonic tissue, either immature prospective muscular tissue or indifferent mesenchymal tissues with the potency for aberrant differentiation of muscle fibres. At the same time he admits that pleomorphic-celled sarcomata in adults have been shown to be rhabdomyosarcomata in which anaplasia has largely deprived the cells of striations and other distinctive features. In recognition of the muscular nature of a tumour, Willis considers that distinct striations are an essential pathological feature of the component cells; but Stout (1946) states that other histological features are sufficient to allow the diagnosis to be made in the absence of striation.

Pathological Features.

The rhabdomyosarcomatous tumour first appears as a fairly well-outlined rounded mass situated deeply within a muscle or muscle mass, and may be situated in any skeletal muscle of the body. The tumour often appears circumscribed, may be surrounded by distended or expanded muscle, and is covered by skin which shows little change, except perhaps some dilated veins in the larger or more rapidly growing varieties of tumour. The consistence of the mass varies with the type of cell and the amount of fibrous connective tissue. In the slowly growing tumour a rather solid mass elastic or tough in consistence may be found, and in the rapidly proliferating neoplasm the consistency is often soft. On section the cut surface may be greyish with areas of redness or necrosis, depending upon the vascularity and other factors. Although the tumours are apparently circumscribed, infiltration into the surrounding muscular tissue is almost invariably demonstrated. In some specimens coarse lobulation may occur.

The microscopic appearance of rhabdomyosarcoma is considered to be characteristic and features spindle cells—small in anaplastic tumours, large in the more mature forms—and giant cell formation is seen in a large number. The nature of the spindle cells and other features have led to the recognition of two main types of tumour: the anaplastic type (immature) and the adult type (mature). The characteristic cell is mainly acidophilic, spindle-shaped or elongated, and, although usually arranged irregularly, may show small bundles of cells running in a parallel fashion. With special staining longitudinal striations may be demonstrated in some of the cells, and less frequently some cross striation. The cell cytoplasm may be granular, the nuclei are larger and vesicular, the nucleoli are prominent, and the chromatin network is deeply staining and distinct. The stroma is poor and usually consists of thin bands of collagen running in all directions.

Rakov (1937) regarded the invariable presence of giant cells and the peculiar intracellular fibrils which are observed in some of the more mature forms of rhabdomyosarcoma as being an essential part of the tumour. The giant cells are of several types; one type has a single bean-shaped nucleus and prominent, finely granular cytoplasm; another variety is composed of very large spindle-shaped cells with several deeply staining nuclei; yet

another variety, consisting of a rounded structure of very large size with numerous nuclei, may be seen on rare occasions. The cytoplasm of the multinucleated giant cells may show peripheral vacuolation giving rise to a spider-web appearance. The fibrils are described as appearing in syncytial formations or in long spindle-shaped cells and often pass into the cytoplasm of adjacent cells. In a summary of the essential features of a rhabdomyoblastoma Rakov enumerated the following points: (i) pronounced polymorphism of the tumour cell; (ii) the presence of spindle cells; (iii) the presence of giant cells; (iv) peculiar arrangement of the stroma; (v) the existence in the cytoplasm of fibrils, which are sometimes striated.

Ewing (1940) ably summarizes the features of rhabdomyosarcoma as a tumour occurring at all ages, of wide distribution throughout the body, of equal frequency in both sexes, and forming a characteristic group of tumours of specific structure and of generally unfavourable prognosis.

The degree of malignancy in this group of tumours is extremely difficult to assess, but local recurrence after surgical excision is remarkably frequent, and metastases at a distance occur by both blood-stream and lymphatic routes.

The only ætiological factor that has been recorded has been chronic irritation from an ununited fracture of the femur which has been followed by the development of a rhabdomyosarcoma of the thigh. Ewing (1940) records two such cases; one was reported by Muller and the other was one of his own.

Clinical Features.

Apart from the association of the tumour with chronic irritation or muscle strain, there has been no known precipitating cause of the condition.

Stout (1946) found that the condition had a maximum incidence in the fifth and sixth decades and that there was a slight preponderance of males among those who suffered from rhabdomyosarcoma arising in skeletal muscles. Willis (1948), on the other hand, comments as follows:

> It is significant that most of the indubital rhabdomyosarcomas with beautifully striated cells come from children or adolescents, and that such tumours are relatively rare in adults.

Furthermore, in the cases he quotes the patients are much younger than the average age found by Stout.

The most frequent sites from which the tumour develops are the thigh, the leg and the trunk. In this distribution rhabdomyosarcoma of skeletal muscle follows the pattern of malignant disease of soft tissue and bone.

The common symptoms arising from the presence of a rhabdomyosarcoma in a skeletal muscle are extremely few. Almost invariably the only complaint is of the presence of a tumour situated in relation to a muscle mass. At the onset there is no pain and no interference with function. The tumour continues to increase in size at a variable rate, sometimes rapidly. With the appearance of metastases local symptoms may arise in other situations, particularly in those who manifest early pulmonary lesions.

Clinical examination reveals the tumour mass to be intimately related to the muscle, of very limited mobility within the muscular mass, but moving with the muscle, and perhaps evidence of invasion of surrounding tissues or the skin may be found. Local invasion is a particular feature of this type of tumour and gives rise to a high incidence of local recurrence following excision. Invasion of the skin is not an early feature in most cases, although in large tumours increased prominence of the skin veins is frequently noted.

In addition to local spread of the malignant tumour, distant metastases are particularly common and occur as a result of blood-vascular and lymphatic spread. The lungs are a common site for metastases. The frequency of regional lymphatic gland involvement is disputed. MacCallum (1933) and Stout (1946) consider dissemination by lymphatics to be of frequent occurrence; Ewing (1940), on the contrary, holds the view that metastases in the lymph glands seldom occur. In the 121 cases reviewed by Stout (1946), 38 subjects were known to have metastases. The sites at which these occurred were as follows: lungs, 23 cases; lymph nodes, 10; skin and subcutaneous tissues, eight; pleura, seven; bones, five; liver, three; kidney, suprarenal, mediastinum and pericardium, two each; pancreas, ovary and brain, one each. Metastases were general in only five cases. Lymph gland metastases were a pronounced feature of the case reported by Hirsch (1929).

In the diagnosis of the condition a fairly well-defined tumour of rather firm consistence, situated within a muscle, of rapid growth and painless, without skin involvement, except perhaps some venous engorgement, must be presumed to be a rhabdomyosarcoma arising from the voluntary muscle. On these grounds a diagnosis of rhabdomyosarcoma of the *adductor longus* muscle of the thigh was made in a case recently encountered, the report of which will now be given briefly.

Report of a Case.

Aircraftman D.R.R., aged twenty years, was examined on March 7, 1950, when he complained of a painless swelling of the upper and inner aspect of the left thigh first noticed seven days previously. He stated that the tumour had increased in size during this period. No other symptoms were noticed, and in his past history no previous illness was recorded except acute appendicitis, for which an appendicectomy had been performed in 1945. Clinical examination revealed an irregularly rounded, smooth tumour two inches long, one and a half inches wide and one and a half inches thick, palpable and visible on the upper medial aspect of the left thigh, of firm consistence and situated within the *adductor longus* muscle. There was no evidence of skin involvement or spread beyond the confines of the *adductor longus* muscle. The inguinal glands were not enlarged or unduly palpable. A tentative diagnosis of rhabdomyosarcoma was made. Radiographic examination of the chest, the lumbar part of the spine, the pelvis and the femora was reported as showing normal appearances, and a blood count revealed no significant variation from normal.

Two days later operation under general anæsthesia was performed. The tumour was found to arise three inches distal to the origin of the left *adductor longus* muscle and to be strictly confined to its upper third, although the tumour had infiltrated the muscle without definite capsulation. The upper two-thirds of the *adductor longus* muscle was removed together with the inguinal glands and deep fascia over the femoral triangle and the lower part of the abdominal wall *en bloc*.

Dr. E. S. J. King, of the Walter and Eliza Hall Institute, Royal Melbourne Hospital, reported on a biopsy specimen of the tumour as a "cellular spindle-cell tumour. Rhabdomyosarcoma".

On macroscopic examination the excised tumour approximated in size to the clinical estimation, and was firm and elastic in consistence and greyish in colour, some central softening being noticeable on section. The muscle fibres were infiltrated and expanded by the tumour, although some pseudoencapsulation in places seemed evident. The microscopic picture was of predominantly spindle-shaped eosinophilic cells with some attempts at fasciculation and having large, deeply staining nuclei in which an open chromatin network was prominent (Figure I). Other pleomorphic cells were found, but no distinctive giant cells were demonstrated. Intracellular fibrils were also not readily visible. The stroma was extremely scanty in amount. The tumour had the appearance of a rapid growth of immature type and had extensively infiltrated the muscle fibres in its vicinity.

A course consisting of small doses of deep X-ray therapy tri-weekly for eight weeks was commenced on March 24, 1950.

A small opaque area was noted in the right lung in a radiograph of the chest on April 6; it became larger and was accompanied by further metastases on further X-ray examination on May 31. At this point a review of the preoperative chest film showed that the metastases arose from small shadows which had been considered normal markings at the time. The number and size of the pulmonary metastases continued to increase, and although postoperative convalescence was uneventful, the patient felt well and there were no signs of local or further visceral metastases, a slight cough developed on July 4 and was followed a fortnight later by expectoration of blood-stained sputum, which was repeated at irregular intervals. The general condition remained remarkably good for about eight

months despite rapid growth of the pulmonary and mediastinal metastases and increasing chest symptoms. A "brassy" cough with moderate amounts of sputum developed, and he experienced several episodes characterized by dyspnœa, cyanosis, weak pulse, and sweating, and proceeding to unconsciousness of some minutes' duration. His weight remained almost constant and his blood count was normal.

On February 7, 1951, his discharge from the Royal Australian Air Force at his own request was effected, and, contrary to advice, he returned to heavy manual work.

Dr. F. D'Arcy Williams, of Cootamundra, furnished his further progress notes, and reported that on May 2, after a period of increasing dyspnœa, blood-stained fluid was

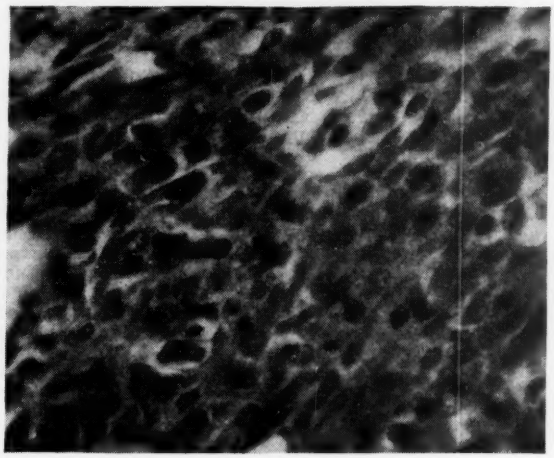

FIGURE I.
Photomicrograph of tumour, showing spindle-shaped eosinophilic cells with prominent nuclei and some attempt at fasciculation.

aspirated from the left side of the patient's chest. He died on May 9. On examination there was no evidence of local recurrence or of metastases, except the extensive pulmonary lesions. Unfortunately, autopsy was not performed.

Treatment.

In the treatment of rhabdomyosarcoma of skeletal muscles simple excision, amputation and radiotherapy preoperatively and post-operatively have all been carried out in various combinations. The results of such treatment do not enable one to enunciate any standard mode of treatment; the only lesson that can be learnt from a review of all the cases reported is that adequate excision must be carried out. This is more difficult than has been previously realized if one judges from the far too frequent reports of local recurrence, repeated recurrence being often noted.

Local excision of the tumour as the only curative procedure was followed in a considerable number of cases by local recurrence; further operations for wider excision or amputation were often required, and the five-year survival rate was very small.

Primary amputation appears to be little more successful than local excision in curing the patient. Amputation, however, may be the only method available whereby adequate local excision can be carried out.

Radiotherapy as the sole therapeutic agent has not been extensively used; those tumours treated by this means all proved resistant to the therapeutic rays. Stewart (1933) considers that the few patients with rhabdomyosarcoma treated by him were resistant to irradiation. Preoperative radiotherapy has been used in a few cases, and in a larger series post-operative irradiation has been carried out. The advantages of such combined treatment are difficult to evaluate, especially as the malignancy of the tumours varies over a wide range and survival periods without operative treatment also show wide variations.

Stout (1946) advocates the removal of a small biopsy specimen with a minimum amount of trauma as a preliminary procedure; radical removal of a large block of surrounding uninvolved tissue is carried out if microscopic examination of sections from the specimen reveals the tumour as a rhabdomyosarcoma.

The results of treatment in any form have not been very encouraging, but it seems reasonable to expect the most satisfactory results from complete local excision, which may necessitate amputation, followed by adequate post-operative irradiation. In the treatment of this condition, as in any other malignant condition, the sound surgical approach is to remove the malignant process together with a safe margin of healthy tissue.

Records of 121 cases reviewed by Stout (1946) reveal only four patients with symptom-free five-year survival; but there were other patients who had long survival periods, but with persisting tumour. Stout concludes:

> If this tumour is to be cured more often, it is evident that extensive removal of the primary growth must be done earlier and more drastically with greater sacrifice of grossly healthy tissues about the growth.

Summary.

The features of the rare rhabdomyosarcoma arising from skeletal muscle are briefly outlined.

A further clinical report featuring a rapidly growing tumour in a young adult male, subjected to operation within a few days of his becoming aware of a tumour, but developing early blood-borne pulmonary metastases, is added to the literature on the subject.

Acknowledgement.

Air Commodore E. A. Daley, F.R.A.C.P., K.H.P., Director-General of Medical Services, Royal Australian Air Force, has kindly permitted the submission of this paper for publication.

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THE RARE Rh ALLELOMORPH c^v.

By BARBARA J. ARNOLD and R. J. WALSH.
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IT is now well established that the chromosome carrying the Rh genes has three loci for these genes. When Fisher and Race (1944) first proposed this theory, they postulated a pair of allelic genes at each locus termed C-c, D-d and E-e. A specific antibody reacting with the red cell antigens corresponding to each of the six genes was known to exist or was later discovered. With the various antisera some red cells were subsequently found to give reactions which indicated the existence of further alleles. Stratton (1946) described the D^a variant of D, Callender and Race (1946) C^v, and later, Race, Sanger and Lawler (1948) two further variants of C-c. These last-mentioned were termed C^a and c^v.

An example of the c^v variant in an Australian family was recently investigated.

Investigation.

The propositus was the husband of an Rh-negative (cde/cde) woman whose serum contained anti-D agglutinins. The husband's red cells were strongly agglutinated by anti-D, anti-E and anti-c sera, but gave a weak reaction with an anti-C + C^w serum. This last-mentioned serum always reacted strongly with cells containing either C or C^w antigens. A further sample of blood from the propositus and one from his second child were tested against three anti-C and the anti-C + C^w sera with the results shown in Table I. This table also shows the reactions given by control cells.

TABLE I.
Reactions with Anti-C Sera.

Subject Serum.	Anti-C.	Anti-C.	Anti-C.	Anti-C+C^w.
Propositus.. ..	−	+	w	+
Baby	−	++	+	$++^v$
C^wD^ue/cde.. ..	−	−	−	$++^v$
CDe/ode	$++^v$	$++^v$	$++^v$	$++^v$
CDe/CDe	$++^v$	$++^v$	$++^v$	$++^v$

Both the father's and the infant's cells were titrated against two anti-c sera and the reactions were scored by the method of Callender and Race (1946) (Figure I). The dosage effect with cc cells is easily seen, and it is apparent

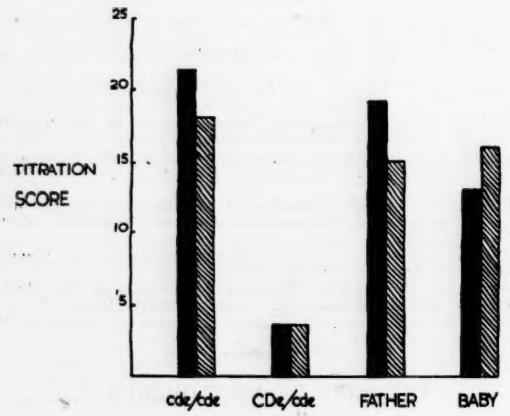

FIGURE I.
Titration scores with two anti-c sera.

that both the father's and the infant's cells reacted as though they possessed a double dose of the antigen c. The first child and the mother and siblings of the father were investigated in a similar manner. The red cells of the first child and of one brother reacted as did those of the propositus. The father of the propositus was not alive, but it is reasonable to assume that his genotype was c^vDE/cde. The family tree is shown in Figure II.

Discussion.

It is obvious that a variant is present at the C-c locus in some members of this family. This variant is thought to be identical with the allelomorph c^v described by Race, Sanger and Lawler (1948). Weak but definite reactions were obtained with three of four anti-C sera. The titration scores obtained with two anti-c sera approached those given by cells containing a double dose of c and were considerably greater than those given by cells containing a single dose (Figure I). This strongly suggests that the variant is intermediary between C and c, but more closely related to c. This contention is supported by the fact that as in the family previously reported the variant is associated with D and E on the chromosome. As has been pointed out by Race, Sanger and Lawler (1948), the combination cDE is common, whilst CDE is very rare in a white population.

The antigenic possibilities of c^v are interesting. It is conceivable that c^v cells could produce pure anti-c^v in the

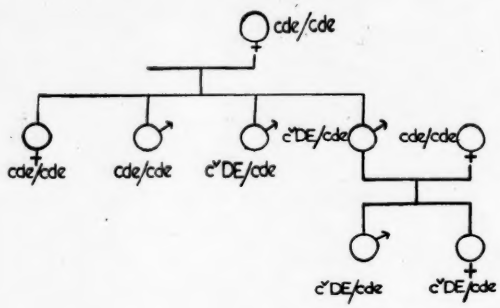

FIGURE II.
Family tree.

same manner as C^w cells may produce pure anti-C^w (Callender and Race, 1946). On this basis it is necessary to suppose that most if not all anti-c sera are anti-c + c^v and that some anti-C sera are anti-C + anti-c^v. This would be analogous to the fact that many anti-C sera are anti-C + C^w. Race, Sanger and Lawler (1948) were unable to separate either antibody (C^w or c^v) from anti-C sera containing anti-C^w or anti-c^v. No similar attempt has been made with anti-c sera, but the selective absorption technique used may not be conclusive for demonstrating the presence of multiple antibodies. If c^v is capable of stimulating the production of pure anti-c^v, the maternal serum in the family investigated may have contained this antibody. The presence of a strong anti-D agglutinin prevented further investigation of this possibility.

It is possible that c^v is not a distinct antigen, but has some antigenic properties of both C and c. On this basis it could be speculated that in suitable subjects c^v could produce anti-C or anti-c. For instance, in a cc person it might produce anti-C, but in a CC person it might produce anti-c. Because c^v appears to be more closely related to c than to C, the second possibility would seem to be more likely. In the family reported anti-C was not detected in the maternal serum.

Summary.

An Rh variant at the Cc locus was detected in four members of a family. The reactions with anti-C and anti-c sera indicate that it is identical with the c^v variant described by Race, Sanger and Lawler (1948). The antigenic possibilities are discussed.

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Reports of Cases.

CORTICAL NEUROLOGY: DISTURBANCES OF SPEECH AND OF THE BODY-IMAGE.

By IAN H. MARTIN, M.B., B.S., D.P.M. (R.C.P. & S.),
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THE first serious attempts at localization of functions within the brain began with Gall (1758-1828), while Dax in 1836 indicated the importance of the left hemisphere for speech, Broca in 1861 published his two reports of cases that led to the isolation of Broca's area, and Trousseau substituted "aphasia" for Broca's "aphemia"; but it was with Hughlings Jackson that the major elucidation of the nature of speech and its disorders began. Jackson (1932) published his first paper on speech disorder in 1864, but his main contribution was his dynamic conception of speech and aphasia. Then followed Bastian (1837-1915) and other "diagram-makers", and Kussmaul, who introduced "word-deafness" and "word-blindness". Wernicke (1848-1905) described his sensory, motor, and conduction aphasias. In 1906 Pierre Marie (1853-1940) stated that there was only one aphasia, Wernicke's sensory aphasia. K. Kleist carried on with "diagram-making". It remained for Henry Head (1861-1940) to return to and develop the dynamic conceptions of Jackson and to write an excellent historical review in his monumental works (1920 and 1926). On this background Goldstein's and Schilder's work on aphasia and on the body-image developed.

Goldstein is particularly notable for his application of *Gestalt* theory to the study of speech and its disorders (Goldstein, 1948), and this book also embodies his holistic theories previously published (Goldstein, 1939).

Schilder, like Goldstein, also applied *Gestalt* principles, but his most notable contributions are to the study of the body-image and its disturbances. His book (Schilder, 1935) on the body-image and Goldstein's (1948) on language form companion volumes of considerable value and importance on these two related functions. Both pay tribute to Hughlings Jackson and Henry Head, upon whose foundations each has built.

Credit for early significant studies on autotopagnosia is given by Schilder (1935) to Pick, Rosenberg, Anton, F. Hartmann, Potzl, and Gerstmann. Gerstmann's syndrome of finger agnosia, agraphia, acalculia, and left-right disorientation is one of the commoner disturbances of the body-image, and results from a lesion in the angular gyrus of the dominant hemisphere. Anton and Babinski are given chief credit for the recognition and elucidation of anosognosia, due to a lesion in the supramarginal gyrus of the minor hemisphere.

Asymbolia for pain and for danger were correlated by Schilder (1935). Asymbolia for pain, first described by Schilder and Stengel (1928, 1931), associated with a lesion in the supramarginal gyrus of the dominant hemisphere, and further reported by Hemphill and Stengel (1940) and Stengel (1943), was regarded by Stengel as almost invariably associated with some kind of word deafness. As described by Stengel (1950) in lecture-demonstrations at the Maudsley Hospital, asymbolia for pain is part of a general nociceptive asymbolia. The noxious stimuli are perceived and often attended to with interest, but there is no reflexive, emotional or adequate conative action against them or their cause. Rubin and Friedmann (1948) regarded it as an extinction phenomenon.

Schilder (1935) uses the term reflexive apraxia to denote difficulty in performing or inability to perform what Liepmann has called reflexive actions. Patients who can handle objects without evincing apraxia are often unable to proffer or indicate parts of themselves on request. They often show amimia, difficulties in expressive movements like threatening or waving, on request, and in performing actions in mime, for example, lighting a cigarette. But it is the action towards their own bodies that is the central feature, for example, they have difficulty in finding their own nose and eyes. This reflexive apraxia is nearly always found when there is object apraxia, but it may be found singly or as a residuum as an object apraxia is disappearing. Finger apraxia is the commonest form of reflexive apraxia—the patient cannot find or move singly a named finger; it may be found alone or as a final residuum as the rest of the apraxia disappears. Therefore finger apraxia provides a delicate test for the existence of apraxia. Reflexive apraxia often extends into external space, so that such a patient has difficulty in acting similarly upon other people, for example, the examiner who is confronting him.

Constructional apraxia—difficulty in carrying out tasks such as pouring a glass of water from a jug—is a common type of object apraxia; but dressing apraxia is less well known. As pointed out by Stengel in his lecture-demonstrations at the Maudsley Hospital (1950), dressing requires spatial manipulation in relation to oneself, to one's body-image, within which the clothes become incorporated and then form a part.

We are familiar with the difference between what Hughlings Jackson called propositional speech, emotional or interjectional speech, and automatic and conventional utterances, such as counting, reciting the alphabet and conventional greetings. Stengel (1950) in his review states that Monrad-Krohn (1947) described as the "prosodic quality of speech" that faculty of language which conveys different shades of meaning by means of variations in stress and pitch, irrespective of the words and the grammatical construction. Besides the intrinsic prosodic character of every language and dialect, there is an emotional and intellectual (propositional) prosody. There are three clinical types of prosodic disorder: (*a*) functional, (*b*) the organic dysprosody, (c) aprosody and hypoprosody due to brain lesions.

These are the less familiar of the types of agnosia and apraxia, including disturbances of speech and of the body-image, shown by the two patients whose case reports follow.

Case 1.

An elderly man was referred to hospital with a four-months' history, following cerebral thrombosis, of irrational conduct. He would be found lying in the hot sun and, when called in, would attempt to run away. On one occasion he ran away in the early morning hours and was found early in the following afternoon in a vacant allotment near by. The provisional diagnosis was arteriosclerotic dementia of moderate degree, but with conspicuous aphasia, chiefly on the motor side.

On examination the patient was found to be an elderly man in fair general health. His blood pressure was 130 millimetres of mercury, systolic, and 85 millimetres, diastolic, and his arteries were slightly thickened. The result of a Wassermann test on his blood was negative. Auricular fibrillation was present.

Neurological examination revealed a pronounced arteriosclerotic facies with loss of mimesis, but not loss of lines of expression. There was no Parkinsonian masking or similar rigidity.

The first cranial nerve was not examined. Examination of the second nerve showed that he could apparently read large print, for example, block letters one-quarter of an inch high, and count fingers, and he could see to eat and find his way about. The optic disks appeared normal. There was moderate retinal arteriosclerosis, with some variation in calibre, and some nipping and displacement of veins at arterio-venous crossings.

The third, fourth and sixth cranial nerves were normal. The pupils were round and equal and reacted to light and accommodation. The fifth nerve was normal. Examination of the seventh nerve revealed right upper motor neuron paresis with mimetic overaction on the right side. The other cranial nerves were normal.

Right-sided hemiparesis was present, but there was some weakness, wasting and spasticity of the muscles of all limbs and of the head and neck. The glabellar reflex was equivocal, the lip reflex was present, but in both cases muscle-wasting and the screwing up of the face in a half-crying expression made assessment difficult. The jaw reflex was very active. Hoffmann's reflex was apparently absent on both sides, but it was thought possible that it was obscured by weakness and wasting and by "grasp and grope" on the right side. The palmo-mental reflex was present on both sides, but the palmar reflexes were not elicited. The abdominal reflexes were brisk and equal in all segments. No *tache cérébrale* was demonstrated. The plantar responses were "extensor" on both sides from a wide reflexogenic area; the response was stronger on the right side, but "fanning" and the Rossolimo reflex were more definite on the left side and the grasp reflex was present on the left side alone.

Praxis and Gnosis.

Speech.—There is jargon aphasia, with perseveration (repetitive utterance) so that the patient tends to repeat "mum, mum, mum", varying the pitch and intensity and his mimesis to attempt to convey his meaning. He will reply to simple questions with a headshake or nod, and carry out simple instructions, so long as they are not long, complicated or semantic; he readily becomes fatigued, showing distress and becoming muddled. Therefore, on the receptive side, for both auditory and visual reception, there was severe semantic and moderate syntactic loss, with fair retention of nominal and verbal speech. On the expressive side there is very severe loss, but there is still some prosodic quality to his "mum, mum, mum" at times.

General.—There is some eupraxic loss, so that when given a pencil he takes it incorrectly and clumsily for writing, which is executed poorly (agraphia). The response is similar for other movement patterns. Movements that are part of mimesis or habitual actions (putting out the tongue, closing the eyes) cannot be carried out on request, though they are performed spontaneously and in their setting (apraxia for voluntary movement), accompanied by associated mouthing movements of primitive mimetic kind. There is pronounced perseveration. The patient can indicate right and left, but only with some difficulty; his obvious uncertainty shows that the condition is not asymbolia for right and left, even though he makes a few errors. No finger agnosia is present. There is no reflexive apraxia, either on himself or on the examiner. Finger apraxia is severe. There is quite severe asymbolia for pain and danger. He is able to carry out constructional praxis actually (strike a match) and in mime (pour and drink a glass of water). Although limited by feebleness and stiffness, he had no dressing apraxia; he sets about dressing appropriately.

Graphia.—He can write his own name and simple words of three letters. If asked to write longer words, he may write the first few letters correctly, but then adds a series of symbols resembling "r", and he always checks carefully to see that he has the correct number of letters. He prefers to print, and if just asked to write a word, prints by choice with greater facility and legibility. With writing, he loses the continuity, strays off the line, and has to return to the point where he broke off and try again; a tremor develops, too, with writing, but not with printing. He can write some numbers up to two digits, and will write two digits correctly of a three-digit number. He does not always write the number asked, but seems to know that it is wrong and is unable to correct it. This is with his left hand, his right hand being paralysed. He is right-handed.

Gnosis is difficult to test, beyond what is apparent from the examination of praxis.

Visual.—The patient can point to his name printed on the case book and to some words. When confronted with a red and yellow bead, he could point to "the red" on command, strayed between red and yellow when asked to point at "the blue one", and acted similarly when asked to point to "the yellow bead". A bead with a diameter of a quarter of an inch was held about one foot away. He could select the threepence when asked to, from a threepence and a two-shilling piece. He could carry out all sorts of actions, complex in themselves, but requiring good visual acuity. He had difficulty in pointing to the correct name when confronted with several printed large on a piece of paper—for example, dog, cat, pig, man—and often erred or failed completely. He could not point correctly to isolated letters or numerals. He made no response to any written commands, however simple, such as "sit up", even when prompted with "I want you to do this".

Auditory.—He readily obeyed simple commands, such as "sit up", and also responded to the signal given: "When I clap my hands I want you to sit up." He sat up in response to "I think it would be advisable if you sat up", but also to "I think it would be unwise for you to sit up". When offered a coin with "I think it would be greedy for you to take that", he paid no attention to the semantic content, concentrating his efforts upon taking the coin. A small amount of information can be obtained by the expedient of asking him to nod for "yes" and shake his head for "no", but the questions must be simple syntactically and non-semantic, and in any case he soon becomes fatigued.

In addition to the apraxia and agnosia there is a general impairment of cognitive faculties of considerable degree, slight confusion that rapidly increases with fatigue, making piecemeal examination necessary, and deterioration of personality and affect, with some affective incontinence; there is severe loss of all the subtle mimesis, and only crude and primitive emotional responses remain. There is, therefore, deep organic regression, with primitive mouthings, spontaneous and in response to being offered an object—he may attempt to take it in his hand, or he may open his mouth, and mouth in characteristic primitive ways of anticipation.

The general state is variable from time to time and from day to day. At times he makes intelligent responses, at others he responds in a sub-human primate manner.

Returning to some of his more conspicuous and circumscribed defects, we may list them as follows.

1. He has no finger agnosia, but definite finger apraxia. He can grasp any named digit of one hand with the other hand, the only occasional error being choosing the wrong hand, but mostly this seems to be due to a greater tendency to use his left non-paretic hand to grasp his right paretic one. Yet, when asked to move a named digit, he gets set to do it, then appears perplexed and labouring, and any other digit or the whole hand of the named side frequently moves; occasionally the correct or wrong digit, or the whole hand, on the opposite side, moves.

2. There is marked asymbolia for pain and danger. He reacts, though often in a rather vague way, to words addressed to him, to objects handed to him, and spontaneously to things about him; that is, he is responsive to these intellectual stimuli. Yet when his hair is suddenly pulled, a sharp needle stuck into him, a door banged behind him, a sudden, angry, threatening expression and gesture offered, or an unexpected blow aimed towards his eyes, he does not react with startled reflexive action against the pain or danger, or with emotional and mimetic response. He responds to these stimuli, but in a curious or interested or mildly surprised way, not emotionally toned. On request he will speak in angry or kindly tones and prosody. He will respond suggestibly to tone of voice and manner carrying anger, friendliness, happiness or sadness; but only slowly, not as an immediate reaction to threatened pain or danger. When asked to wave his hand angrily he is at a loss, showing a degree of amimia. For example, he holds his left hand before him, opening and closing it, now rapidly, now slowly, as though perplexed, and trying one way, then another, without success. When asked to wave it in a friendly fashion or to wave good-bye, he did the same again with the left hand. When asked to beckon me and, later, to point the way to the window, he used his paretic right hand and arm and carried out movements that were vaguely and reasonably correct, allowing for the paresis, and so better than with the left

hand. When asked to beckon and to point with the left hand, he carried out the same left-hand movements as before. When he was asked to wave with the right hand, the movements were again vaguely and reasonably correct, allowing for the paresis; but after a short time the same difficulties arose as with the left hand. When he was asked to salute with the right and the left hand in turn his responses were congruent with the above right-hand and left-hand responses respectively. After leaving him, I returned suddenly, thrust out my hand suddenly, and said "good-bye"—that is, using maximal suggestion, stimulus and example. He responded after a little perplexed delay, but only vaguely, lifting his hand a little towards mine. Even when I grasped it he made no attempt to shake my hand, although there was a slight grasp, probably reflex in origin.

Case II.

A female patient, aged seventy-one years, had a history of gradual deterioration, occurring over several years, in conversation and behaviour, but very much worse after an epileptiform seizure four days before her admission to hospital. Since this attack she has taken no notice of others, talking and muttering to herself, has appeared not to recognize anything at table, does not cooperate at all, and shows no comprehension of personal hygiene.

On physical examination of the patient, moderate arteriolosclerotic changes were evident in the ocular fundi. The arteries were of medium size and thickened. The blood pressure was 170 millimetres of mercury, systolic, and 90 millimetres, diastolic. A soft systolic bruit was heard in the heart. Some arthritis was present in the hip and knee. A provisional diagnosis was made of arteriosclerotic dementia of moderate degree, aggravated by recent ictus, with marked agnosia and apraxia of certain kinds, and some post-apoplectic confusion.

Agnosia and Apraxia.

The patient exhibits a general hyperkinesis with psychomotor rapidity and fluency. She is right-handed in all her activities.

Visual.—She can see her way about, can see objects at a distance, and can read her name, various words and numbers of standard typewriter size in type, in block print and in handwriting.

Reading.—She read "The dog ran up a tree", but saw nothing strange in it, saying that her dog often ran up a tree. "He doesn't mind." She read "Virtue carries its own reward" and the same block-printed, but could not explain its meaning, which was obviously lost on her. She could not describe what a virtue was or give an example. When asked, in sequence, was killing, an apple, a pencil, thieving, a virtue, she said "Yes, that's just it". To goodness, kindness, killing and generosity she gave variable answers showing her loss of semantic understanding. She read "If we were able to run faster we would not miss the tram so often; but there is always another tram behind, unless it is late at night". She made a few errors and omissions from hurried carelessness, but when her attention was more carefully directed, she read it correctly, with quite good prosody. Questions showed that she had not grasped the implications, but she used fragments from it in her answers and in subsequent chatter out of context. She read "What is a tram?" in a suitably questioning voice; but she made no attempt to answer spontaneously or when guided indirectly or asked directly. A "?" she imitated with her finger, then she pointed to the sentence above, saying "That's 'What is a tram?'". She did not name it. She was asked to write "How are you?", which was dictated, to see if she would use the "?", but failed to write. She read, but did not obey, "Stand up", then added, "he said there", nodding at the written words. When asked ("Won't you do that?"), "No, we can't do it, so that's all about it", but she stood up. ("Why do you stand up?") "Well, somebody knows about it." When shown "Stand up" again, she did not show any greater understanding or react as to a command, even though her standing up had appeared to be the result of the suggestive influence of the words she had read.

Colour.—("What colour is your hair?") "About three I suppose." ("What colour is your gown?") "Blue" (correct). ("What colour is that light?") "Blue" (actually red). ("What colour is my shoe?") "Brown" (correct). ("What colour is my watch strap?") "Oh I don't know. It's no good to me." ("What colour is this towel?") "The same as that" (another white towel). "Haven't you seen that?" ("What colour are your slippers?") "I don't know, I can't see them properly" (holding them out in view).

Mimesis.—There is some suggestibility in her mimetic responses and she recognizes and replies to a farewell wave of the hand.

Counting.—She can be induced to count some things, for example, four coins, and on several occasions, fingers held up; but she frequently evades the point. She counted spontaneously up to eight, but then was distracted by other thoughts and would not continue, becoming irritable when pressed. Whenever the sun shone, when clouds cleared, she would remark, "Oh, it's nice and warm" or "Hallo, here's the sun". She showed me her right hand on request.

Auditory.—She can hear quite well for high and low pitch, loud and soft tones, and responds to the prosodic quality of speech, being rather suggestible as well. She understands and answers simple questions and carries out simple instructions, so long as the words and syntax are simple; but she often does not recognize names and seldom comprehends even simple semantic meanings, the attempt usually leading to complete failure. She easily becomes fatigued, so that unless variety and pauses are freely used she performs poorly. She understands and responds normally to conventional greetings.

Writing.—So far she has not succeeded in writing or printing any word, even her own name. When asked to write "How are you?" she made an unsuccessful attempt; then her attention was distracted by other thoughts and she could not be induced to write again. There is no apparent motor or sensory disturbance of the hands, which she can use for a variety of skilled operations. She takes, holds, and uses a pencil in the normal way. When asked to copy the printed words cat and dog she drew, respectively, an arrow head pointing vertically downwards and an irregular scrawl in roughly a spiral pattern; these were similar to the marks she made when asked to write the words before being given the printed words to copy.

Speaking.—She speaks clearly and intelligibly, using normal words and phrases until she becomes fatigued, when portmanteau words, neologisms and clang association words replace the correct ones. Her general hyperkinesis is particularly evident in her logorrhœa. At times she names many articles, especially spontaneously, or in the course of conversation; but even on request: sometimes she fails in a proportion of names; sometimes there is paraphasia of varying degree, with circumlocution and reference to, or miming of, the use or characteristics of the article she cannot name; sometimes there is complete nominal aphasia, and her response is quite irrelevant and frequently a jargon paraphasia. Her syntax is simple; she uses many phrases and fails to complete many sentences. There are only rarely subordinate clauses, and then they are of the simplest kind. There is no continuity of topic, though she may meanwhile be persisting doggedly with some manœuvre, such as folding and smoothing her clothing or shuffling with the aid of a chair towards some goal. Although she continually converses with herself while carrying out such a manœuvre, frequently bringing it into her conversation, the whole is such a garbled string of isolated, unconnected fragments from this and other contexts that there is no apparent continuity of subject. However, her prosody is normal, and if one could not hear the content, she would give one the impression that she was exhorting herself continually towards the achievement of her goal. Rhythm and tone are quite good. Although she uses words of semantic quality, it happens only fortuitously, when such words occur in the clichés that form a large part of her discourse—for example, "We mustn't weaken, must we?", "Faint heart never won fair . . ., did it?" *et cetera*. She makes use of interjection and exclamation, and expresses pleasure, anger *et cetera* in

words, expression and gesture. She would wave good-bye and shake hands.

Orientation in Time.—At 5 p.m. on April 10, 1951, she could not judge the hour or tell the time by my watch. "What a scinty little clock! Well I never!" She did not seem to understand the question "Is it day or night?" and could not tell me what meal she was eating (tea). She guessed a wrong time after peering at the watch and handling it in a way that showed she did not properly comprehend its purpose, treating it more as a fascinating trinket. ("What day is it?") "Twenty-two, I think it is, today." ("What are the days of the week?") "They've been told to say it can be done." ("Recite the days of the week. Monday . . .") "Tuesday, Wednesday, I suppose; I can't find the others." ("Go on.") "I just can't hear it. I can't see anything about it." ("Recite the days of the week. Monday . . .") She followed with the rest of the days. ("How many days in a week?") "Oh it takes some time doesn't it? I'll have to go out here and see what's here." ("What is the date?") "The date? Well that wouldn't be very much." ("What year is it?") "Well, it's today." ("1849?") "Well, yes, I suppose that's about the time." ("What year is this?") "Well, it hasn't had anything like this to do."

Orientation in Place.—("What place is this?") "Just across there. That's the only thing I think. It's somewhere near the other place." ("What building is this?") "Oh, the building? It's here" (indicating with a sweep of her arm). ("Is this a hotel?") "No. Ask Mr. What's-his-name." ("Is it a station?") "Oh no." ("Is it a hospital?") "Yes, just a tiny small thing." ("Is it a hospital?") "Yes, it's a hospital." ("What sort?") "A hospital like we have in town. I don't know just how you'd call it. It's just something that helps to the lads." When asked the points of the compass, she pointed north-west for north, south, east and west in turn. Again ("Where is west?") "Oh, we haven't got that at all." She would point, without looking, to the door through which she would leave the room, and along the corridor to the sitting-room with which she is very familiar, but not to the dining room or bathroom, to which she has not been, but which would have been noted easily by a normal person. She spends most of the day sitting in the sitting-room and is walked along the corridor to and from her bedroom.

Autotopagnosia.—("Show me your left leg.") "Yes. Well, where is it?" ("Show me your left hand.") "Well, I haven't got one." ("Where is your left hand?") "Up here on my hand" (holding her right arm out). ("Where is your right hand?") "On the left hand. I haven't got it again." ("Where are your hands?") "Outside, somewhere." ("Where is your thumb?") "I'll tell you in a moment." (She began searching under the tablecloth for it.) To test whether she understood what was required, her parts were indicated, and although she could not always name them, she always selected the correct name—for example (correct word in italics), ear, cabbage, chin, *nose*, leg; finger, arm, ear, *hand*, egg, foot; foot, toe, finger, *thumb*, door, eye. When asked the questions mentioned above, she looked for the missing part first in the correct place, then about her person, then about the room, under the tablecloth *et cetera*, nearly always in that order, but sometimes missing out a step. Whenever she did respond by producing a limb, which she did rarely, it appeared to be accidental if it was of the named side. When a limb or other part was grasped and she was asked whether it was left or right, again it appeared to be accidental if the answer was correct. Later, when asked ("Which hand is this?") "Oh, that's the right one" (incorrect). ("Which leg is this?") "The left one" (correct). This showed that she knows the connotations right and left. Therefore there is left-right disorientation. ("Show me your middle finger.") "Oh dear, it's gone away. I had it here, but it's gone. I suppose it's taken off." ("Show me your thumb.") "That's gone, too. Oh, here it is" (holding it up). ("Show me your ring finger.") "It used to be here" (stroking the base of, moving and examining the left ring finger). "It was here, but it's gone away. It must be somewhere [looking about herself, then under the tablecloth]. We must find it." She kept up a continuous, restless, searching activity, her speech losing connexion and relevance, but the prosody continuing unchanged. Therefore there is finger agnosia, which, apart from the one success with her thumb, was unrelieved. She was able to show me her nose, her chin and her mouth, which are mid-line structures; but as it was with her limbs so it was with her eyes, ears and cheeks, which are bilateral structures.

Acalculia.—She can count up to twelve at least. When presented with three right fingers and four left fingers, she counted "1, 2, 3" and "4, 5, 6, 7"; then she peered under my hands and counted the concealed digits, but carried on to 12. She did not add, subtract, multiply or divide even the simplest numbers, and would not recite her "3 ×" table. When asked if $2+2=4$, $3\times2=6$, $3\times3=12$, $3\times5=26$, she replied "Yes" to every one. When shown three coins, then two coins, separately, she did not answer how many altogether. Yet she recognizes written and spoken numbers, and when I asked "Add 3 and 4" she replied "Oh, you want me to add them", in a way that seemed to show comprehension of the question.

There is no eupraxic disturbance of movement patterns and no objective apraxia for ordinary activities. She can take and hold a pencil, do up buttons, fold paper and open doors, spontaneously or upon request. There is reflectory apraxia in that she cannot touch parts of her head and neck on one side with the opposite hand, on command, when the hand and part (for example, left hand to right ear) are named, touched or demonstrated; it seems likely, but not certain, that she understands but cannot act in this way; because she appears perplexed and to be trying, and she will touch the homolateral part on request ("Touch your ear with your hand") or on demonstration. If the side is named it makes no apparent difference, and if she chooses the correct side it seems to be fortuitous. However, she shows no reflectory apraxia for the more automatic movements of moving her hand to a part stimulated by pain or tickling. It is difficult to test for finger apraxia because of the finger agnosia. She does not make isolated movements with a finger named or touched or by imitation, but often moves the hand or several fingers. There is no constructional apraxia; she can strike a match, can pour and drink a glass of water, actually or in mime, and can manipulate cutlery unaided in eating. There is a dressing apraxia of severe degree. After a great deal of ill-directed folding and smoothing of the hem of her top-coat she finally slipped it off her shoulders. When it was taken off and she was asked to put it on, she was quite at a loss. She smoothed it, folded it, explored it, and manipulated it in a way that showed no proper realization of its nature as a garment, and no proper idea of how to act towards it. At length, encountering the distal end of the sleeve, she explored the opening; but even then one felt that she was not trying to put it on. When the garment is held for her and the pattern of movements initiated, she tends to follow automatically; but if this is interrupted, she again is at a loss.

She does not signal her bowel or bladder needs, wetting or soiling if her needs are not anticipated regularly. When sat on the commode, she responds fairly promptly, though she shows no real understanding of the commode as an object. She is continuously possessed of hyperkinetic activity, appearing full of purpose and persistence, and it is accompanied by a ceaseless flow of talk, appropriate in prosody, but irrelevant and disconnected, a phrase which sums up her activity as a whole.

On examination she becomes fatigued rapidly; testing has to be piecemeal and often repeated before one feels at all confident of the result, because with fatigue her performance falls off sharply, even though she has never been pushed so far as to show confusion. Even so, her performance has varied from test to test.

Comment.

These cases have been reported firstly because, while such disturbances are incompletely understood, their detailed examination and description will be of interest and may add a little towards their elucidation; secondly,

to draw attention to this group of disorders, whose victims are commonly thought to be confused or demented and are certified as mentally defective, with scant investigation. Many of them are mentally defective because often these disturbances are found in a setting of diffuse organic brain disease, such as arteriosclerosis or general paralysis of the insane; but when such a disturbance is the result of an isolated, limited thrombosis, the outlook is vastly different. As the initial post-apoplectic confusion subsides, a careful study of the nature of the disabilities will often show that a limited amount of understanding and help by relatives will enable the patient to carry on a satisfactory independent existence.

This is so, for example, with motor aphasia. The baffled and frustrated victim readily becomes frightened, emotional, fretful and resistive, and appears to be demented or confused. The grateful joy that dawns when he is first understood and helped to find his way around his difficulties is reward indeed for the painstaking task. It is difficult to imagine the predicament of an elderly person suddenly cut off from communicating with his fellows by speaking. When he is shown that he can nod or shake his head and use various other signs and write to convey something of what he cannot say, his relief and return of hope are great.

The alternative, a life of isolation and helplessness, aggravated by all the concomitants of emotional disturbance, anxiety, frustration and confusion, is a dark one.

It is with the hope that more of the fraction of such patients that can be helped will be detected and saved such darkness that these two cases are reported.

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Reviews.

JOHN SINGLETON.

"PIONEER DOCTOR" is the biography of John Singleton, written by his great great granddaughter, Mary Kent Hughes, who is also a doctor.[1] His whole life is dealt with from his earliest days as a boy in Ireland, and the account includes descriptions of the lovely Irish countryside, together with the various experiences of the youthful medical student. After graduating Singleton set up practice in the squalid slums of Dublin, where an outbreak of cholera was an early trial to his zeal for the welfare of the poor. The disastrous famine caused by the failure of the potato crops in 1848 compelled many thousands of Irish peasantry to emigrate either to America or Australia, and among them was John Singleton with his wife and seven children. The seventeen weeks' voyage on a ship of 900 tons, despite storms and sickness, was accomplished without loss of life, and soon after arrival in Victoria he was hard at work. Lovers of bush stories will greatly enjoy the tales of gold rushes, shearing sheds and country hospitality.

Singleton was undoubtedly a great humanitarian, and despite his extensive practice in and around Melbourne, he found time to start the first Free Dispensary in 1869, and a few years later opened the Melbourne Children's Hospital, followed by night shelters for homeless men and women, and then cottage houses for lonely aged widows. Doctors and laymen alike will enjoy this book which is unique in that it links the early development of Australia and of medical practice therein with a biography.

[1] "Pioneer Doctor: A Biography of John Singleton", by Mary Kent Hughes; 1950. Melbourne: Geoffrey Cumberlege, Oxford University Press. 8½" × 5½", pp. 170, with some illustrations. Price: 10s. 6d.

TRAUMATIC SHOCK.

"BIOLOGICAL ACTIONS OF THE ADENINE NUCLEOTIDES", by Green and Stoner, presents the investigations into traumatic shock carried out during the second World War, in the pathology department of the University of Sheffield, for the Medical Research Council.[1]

The authors review previous hypotheses. The earliest was the "nervous", which postulated nerve centres exhausted by excessive stimulation. Then came the "toxic" hypothesis, popular during the first World War, but losing favour because no toxic agent was identified. Histamine was suspected for a time, but histamine shock was shown to be unlike naturally occurring shock. Then arose the hypothesis of fluid loss into the damaged tissue, but, because of the beneficial effects of tourniquet replacement and the varying effects of fluid replacement, this factor is no longer thought to be dominant. The pendulum is swinging in favour of a "metabolic" hypothesis. After injury, a redistribution of normal constituents of the body (such as sodium, potassium and phosphorus) occurs, and it is possible that this could produce shock. The injection of fresh muscle extract produces shock, and from this extract, adenosine triphosphate was separated. The authors devoted their attention to this and to other adenine nucleotides, derived from the purine bases. These are related to nucleic acid. Normally they belong within the cell, where they exercise important functions in intracellular respiration and in the metabolism of carbohydrates and fat and protein. They are also concerned in the conversion of chemical into mechanical energy in contracting muscle, and it has been observed that myosin threads contract on contact with them. The authors produce evidence which suggests, although it does not prove, that these bodies are displaced from the cell by injury, enter the general body fluids and produce shock.

This work must be of great interest to workers in many branches of experimental medicine.

[1] "Biological Actions of the Adenine Nucleotides", by H. N. Green, M.A., M.D., M.Sc., and H. B. Stoner, M.D., B.Sc., with a foreword by Sir Edward Mellanby, G.B.E., K.C.B., F.R.S., M.D., Sc.D., F.R.C.P.; 1950. London: H. K. Lewis and Company, Limited 8½" × 5½", pp. 238, with 65 illustrations. Price: 25s.

EYES IN INDUSTRY.

A BOOK by Campbell, Riddell and MacNalty entitled "Eyes in Industry" is a worthy attempt to stimulate interest in the many very important subjects covered under its title, not only among industrial executives and employees, but among welfare workers, industrial medical officers, first-aiders, factory inspectors, trade unions and the Government.[2]

The question arises as to how it can best be brought to the notice of such an audience. The answer seems to be through industrial management. If directors of industry

[2] "Eyes in Industry: A Comprehensive Book on Eyesight Written for Industrial Workers", by Dorothy Adams Campbell, M.A., M.B., B.S., W. J. B. Riddell, M.D., F.R.S.E., F.R.F.P.S., Sir Arthur Salusbury MacNalty, K.C.B., M.A., M.D., F.R.C.P., F.R.C.S., Hon. F.R.S.E., with a preface by The Lord McGowan, K.B.E., D.C.L., LL.D., and an introduction by Sir Steward Duke-Elder, K.C.V.O., D.Sc., Ph.D., M.D., F.R.C.S.; 1951. London: Longmans, Green and Company. 10" × 7", pp. 250, with 26 plates, some in colour. Price: 49s. 6d.

could but read the forceful introduction to this book by Sir Stewart Duke-Elder, most of them would immediately purchase several copies of it for circulation among their staff and, in addition, enlist the aid of competent lighting engineers and have well-chosen colour schemes introduced for special tasks. The economic aspect as presented by him is staggering.

The incidence of eye injuries in industry is far too high, and in this book the author has made a strong appeal to management by stressing the enormous increase in the cost of production through lost time from eye injuries which are almost all preventible. In addition, he points out how the quality and quantity of production can be greatly improved by attention to the eyesight of employees and the illumination under which they work.

The book also contains a simple description of the eye and how it functions, and deals with visual hazards in industry and their prevention, special aspects of industrial eye injuries and first-aid treatment. Not all will agree with the suggestion that a works nurse or first-aider should be allowed to use a spud to remove a foreign body imbedded in the cornea after the instillation of anæsthetic drops.

A schedule of recommended values of illumination and another on visual standards in industry should be very helpful.

DEMENTIA PRÆCOX.

"DEMENTIA PRÆCOX OR THE GROUP OF SCHIZOPHRENIAS" is a translation of the now classical German edition (1911) by the late Eugen Bleuler.[1] The cynic who reads on the paper cover that this is the first of a projected series of reprints of monographs on this subject may well wonder if this spate of literature does not indicate that we are still ignorant of the fundamental nature of this variety of mental disorders. The present work will appeal more to the medical historian who is interested in tracing out the evolution of concepts concerning morbid processes. It is a little startling to read in the short chapter on therapy, "at present we know of no means which will cure the disease as such, or even bring it to a halt". The reader will find no help in differential diagnosis, except to find that what perplexes the psychiatrist today was also a problem in 1911. The diagnosis from confusional states is "most difficult", since "a diagnostically useful description of these states does not as yet exist". There is, of course, no reference to the various psychological tests such as the Rorschach, which had not been invented in 1911. Bleuler's concepts of negativism, ambivalency and ambitendency as basal mechanisms in schizophrenia are now "text-book" matter. This handsome and imposing volume ends with a list of 850 references, but none since 1908.

X-RAY DIAGNOSIS.

VOLUME I of the second edition of "A Text-Book of X-Ray Diagnosis by British Authors", edited by S. Cochrane Shanks and Peter Kerley, has been received from the publishers, H. K. Lewis and Company, Limited, of London.[2] This volume covers the central nervous system, the teeth and jaws, the eye, accessory nasal sinuses and the temporal bone. The authors consider that the use of X rays is of great importance in skull lesions and leads to a more accurate localization of intracranial lesions which give doubtful clinical signs. Good technique is most essential, and the authors consider a compression band to be superior to the head clamps in the positioning of patients, and think that stereoscopic films are of great value. Illustrative films with explanatory line drawings of the projected structure are most useful in the description of the radiological appearances.

Ventriculography and encephalography are described concisely and air is recommended as the medium rather than oxygen. High blood pressure contraindicates the use of these methods. Cerebral angiography is included for the first time and the clinical details and early discoveries are treated adequately. More space and more illustrations might have been devoted to differentiation of tumour types as this seems to be one of the most important functions of angiography.

Congenital and infantile malformations are fully described and illustrated, and the changes seen in such conditions as erythroblastic anæmia, rickets, osteomyelitis and xanthomatosis are discussed.

Infections of the skull and recent advances in the investigation of spinal conditions are dealt with and the authors consider disk protrusion to be due to a degenerative process (probably avascular necrosis); the commonest sites for this condition are in the lower cervical and lower lumbar regions. Myelography is not of much value in investigating these conditions.

The section on the teeth and jaws is comprehensive, but contains no new work. In an examination of the temporomandibular joint it is of importance to take views with the jaw open and shut.

Part III deals with the eye, and the authors consider the Sweet's improved method to be the most accurate for the localization of foreign bodies. The accessory nasal sinuses are discussed in Part IV and the anatomical descriptions and illustrations are most complete. The authors are not over-enthusiastic about the use of opaque oils in accessory sinus work, although the Americans use them widely. The section on the temporal bones includes the examination of the mastoid region.

The work is well up to standard and should find a place in the library of every radiologist.

[1] "Dementia Præcox or the Group of Schizophrenias", by Eugen Bleuler, translated by Joseph Zinkin, M.D., with a foreword by Nolan D. C. Lewis, M.D.; 1949. London: George Allen and Unwin, Limited. 9" x 6¼", pp. 558. Price: 63s.

[2] "A Text-Book of X-Ray Diagnosis by British Authors", in four volumes, edited by S. Cochrane Shanks, M.D., F.R.C.P., F.F.R., and Peter Kerley, M.D., F.R.C.P., F.F.R., D.M.R.E.; Second Edition, Volume I; 1951. London: H. K. Lewis and Company, Limited. 9¼" x 6¼", pp. 448, with 439 illustrations. Price: 45s.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Wonderfully Made: Some Modern Discoveries about the Structure and Functions of the Human Body", by A. Rendle Short, M.D., F.R.C.S.; 1951. London: The Paternoster Press. 7½" x 5", pp. 160, with 18 figures. Price: 6s.

Written for the person of "ordinary education".

"Venereal Diseases Described for Nurses", by R. C. L. Batchelor, M.A., M.B., Ch.B., D.P.H., F.R.C.S.Ed., M.R.C.P.E., and Marjorie Murrell, M.B., B.S., D.P.H., F.R.C.S.Ed., M.R.C.S.; 1951. Edinburgh: E. and S. Livingstone, Limited. 7½" x 5", pp. 230, with 43 illustrations. Price: 12s. 6d.

The authors describe the different forms of venereal disease and their varying infectivity; they also discuss ethical and sociological considerations.

"Gynæcological Endocrinology for the Practitioner", by P. M. F. Bishop, D.M. (Oxon.); Second Edition; 1951. Edinburgh: E. and S. Livingstone, Limited. 7½" x 5", pp. 142, with 16 figures. Price: 12s.

The first edition was published in 1946; the second has been largely rewritten.

"The Essentials of Modern Surgery", edited by R. M. Handfield-Jones, M.C., M.S., F.R.C.S., and Sir Arthur E. Porritt, K.C.M.G., C.B.E., M.A., M.Ch., F.R.C.S.; Fourth Edition; 1951. Edinburgh: E. and S. Livingstone, Limited. 10" x 6½", pp. 1278, with 644 illustrations, some in colour. Price: 55s.

A new edition published after an interval of twelve years.

"Applied Anatomy for Nurses", by E. J. Bocock, S.R.N., S.C.M., D.N., and R. Wheeler Haines, M.B., D.Sc., F.L.S. Edinburgh: E. and S. Livingstone, Limited. 8½" x 5½", pp. 332, with 231 figures. Price: 15s.

The book follows closely a course of twelve lectures given for some years at Saint Thomas's Hospital, London.

"Instruments and Apparatus in Orthopædic Surgery", by E. J. Nangle, M.B., Ch.B., F.R.C.S.; 1951. Oxford: Blackwell Scientific Publications. 10" x 7½", pp. 246, with 200 illustrations. Price: 42s.

The author selected material for this book so as to make it complementary to other works on orthopædics.

The Medical Journal of Australia

SATURDAY, SEPTEMBER 15, 1951.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

DERMATOLOGY AND ITS DEVELOPMENT IN AUSTRALIA.

DURING the last few years a change has come over what may be called the face of dermatology. Not so very long ago it was looked on as a minor specialty concerned only with the appearance of certain changes in the skin; indeed, there may still be some who regard it in this way. It was often thought to be an unpleasant study and this attitude somehow recalls the cry of Job: "My skin is broken and become loathesome." The growth of understanding has been a relatively slow business and possibly dermatologists, because of their self-imposed isolation, have been partly responsible. Increased understanding of the importance of dermatology has been due in no small measure to the realization that many dermatological conditions are manifestations of a psychosomatic process. An Ethiopian may not be able to change his skin, nor the leopard his spots, but the influence of the nervous system can produce the most amazing skin pictures. This subject was well discussed at the seventh session of the Australasian Medical Congress (British Medical Association), held in Brisbane last year. The section of dermatology held an important discussion on psychosomatic dermatoses. (An account of this discussion will be found in THE MEDICAL JOURNAL OF AUSTRALIA for July 22, 1950, at page 145.) The importance of such a discussion at a general medical congress cannot be over-estimated. In proportion as all the practising members of the medical profession remember that the skin is an important, if not the most important, organ of the body and that manifestations of deep-seated disease may be present in it for any trained observer to recognize, so will dermatology fulfil its true function and dermatologists their destiny.

In 1947 M. B. Sulzberger and R. L. Baer found it necessary in their "Year Book of Dermatology and Syphilology" to discuss some common misconceptions regarding dermatology. Among the points on which they insisted was the fact that the skin is the largest organ of the body. It is a complex structure and its functions are manifold and diverse; it is exposed to many influences from within and to many forces from without. They emphasized this point in order to combat the contention that dermatologists use unduly strange names for skin diseases. They thought that the idea that dermatologists employed ponderous terms was due mainly to the prevalent systems of teaching medicine. Students in medical schools did not, in their opinion, become acquainted with dermatological nomenclature, which was likely to be used by them in later life far oftener than they used the names of rare diseases which were never seen. Another view which they combated was that the treatment of skin disease had a foundation less scientific than that of the treatment of the diseases of other organs. Again, they discussed the suggestion that the treatment of skin disease had less satisfactory results than the treatment of disease in other organs. From the point of view of general practice emphasis should be laid on a statement by Sulzberger and Baer that dermatology encompasses a group of diseases which represent an estimated 10% to 15% of the everyday practice of the medical practitioner, and which, on account of the accessibility of the skin, are ideal objects for the study and teaching of biology, physiology, and pathology, and of all the basic sciences of medicine as well as many of the principles of diagnosis, prevention and treatment.

The dermatologists of Australia are making a serious attempt to extend their activities and their sphere of usefulness. In April, 1949, the Dermatological Association of Australia was formed as a Special Group within the British Medical Association. Dr. John Belisario, of Sydney, was elected president and he suggested that an *Australian Journal of Dermatology* should be published. A committee was appointed to investigate and report on the feasibility of the project; the members of the committee were Dr. J. M. O'Donnel of Perth, Dr. R. B. Perkins of Sydney, and Dr. I. M. Wartzki of Melbourne. At the annual meeting of the association at Brisbane, in May, 1950, Dr. Adrian Johnson, of Sydney, was appointed the editor of the new journal and an editorial board was elected. The members of the editorial board were Dr. B. B. Barrack (Brisbane), Dr. J. C. Belisario (Sydney), Dr. F. C. Florance (Sydney), Dr. J. H. Kelly (Melbourne), Dr. J. M. O'Donnell (Perth), Dr. W. C. T. Upton (Adelaide), and Dr. I. M. Wartzki (Melbourne). The first issue of this journal has appeared and is full of interest. It is a crown quarto production and comprises 80 pages. Among the contributions attention should be drawn to one by John T. Ingram, of Leeds, England. He writes on dermatology and the undergraduate. The author refers to the encouragement given by the "liveliness of dermatological progress" in Australia. The liveliness to which he refers is shown by the institution of a diploma in dermatological medicine, and more particularly the course of instruction imposed for that discipline, the formation of the new association, the launching of the new journal. Ingram joins Sulzberger and Baer and other writers in recognizing "the increasing interpretation of skin diseases upon the basis of general medical principles, and the abandonment of a specialist outlook". Ingram insists that the skin does, in fact, reflect upon its surface for easy study and observation every facet of health and disease. The study of the skin is important for the student in training. "In future practice he will consciously or unconsciously recognize most of the expressions of health and disease in his patients through their reflections in the skin, an art which must have been

developed to a high degree by our fathers in clinical medicine before the modern scientific age." Ingram suggests that as Australia is striding ahead so vigorously in the post-graduate field in dermatology, she should also set an example to other British schools in the undergraduate field. The observation and study of a patient's skin as a first exercise in the approach to every clinical problem must serve to remind the student of the "essential humanity of his calling" and of the importance of the broad consideration of his patient as a whole against the elaboration in detail. It is true that certain appearances can be recognized as indicative of certain types of individual, and that such factors as nutrition and nervous and vascular tone, endocrine and metabolic activity, help to determine the appearance of skin and its appendages. There are few disturbances of health which do not convey to the skin, the hair or nails some indication of the disease, and Ingram holds that it is a serious lapse in medical training if the student is not made to be aware of the opportunity presented to him by the skin for the ready and effective practice of his art.

The liveliness of Australian dermatology (to quote Ingram's phrase) has been mentioned and dermatologists are to be congratulated on all that they have done. We have seen that dermatology is not a small and isolated specialty, but that its study must be part of the study of all disease. This means that dermatologists must be careful not to adopt an attitude of "splendid isolation". It is fatally easy to limit scientific discussion to a small group of persons who are particularly interested in detail and in exact methods of treatment. Nevertheless, it is important that this kind of discussion should take place and dermatologists will have the opportunity of doing this in the special meetings of their association and in their special journal. One satisfactory feature of the present dermatological liveliness is the fact that the new association remains part of the British Medical Association, which comprises those studying every branch of medicine as well as those devoted to general practice. Dermatologists will need to bear in mind the need to take part in general discussions on medicine. They know that their special province, the skin, is day by day becoming more important in the general field of medicine, and this means that they will have something to contribute to the common pool of knowledge. In the face of this important fact they will not neglect any scientific gathering if it deals with a subject on which they may be able to throw some light. It is not unlikely that in certain circumstances they may also be able to learn something.

Current Comment.

PRIMARY CARCINOMA OF THE LIVER.

IN his chapter on epithelial hyperplasia and tumours of the liver in his book on neoplastic diseases, Ewing states that two main classes of primary epithelial tumours are universally recognized as derived from (*a*) liver cells, and (*b*) intrahepatic bile ducts. He mentions a third class that includes mixed tumours in which both liver cells and bile ducts are represented. The simplest terms designating these tumours are "liver-cell", "biliary", and "mixed" hepatic carcinoma or adenoma. Ewing points out that the term hepatoma has come into general use and has the great advantage of avoiding implications with adenoma and carcinoma, while it sufficiently designates any tumour of liver cells. Cholangioma is, he adds, a parallel but less satisfactory term designating tumours of bile ducts. Ewing states that cirrhosis is the chief predisposing factor of liver tumours, occurring in about 84% of hepatomata and 50% of biliary tumours. The cirrhosis is usually portal or biliary in type and is often of alcoholic or syphilitic origin. "There is little doubt that cirrhosis, and the factors that lead to it, cause degeneration followed by regenerative overgrowth which may become excessive or neoplastic." This excessive hyperplasia signifies failing compensation and is favoured by fatty degeneration and thrombosis of veins. From these facts Ewing concludes that the cirrhotic process must be regarded as both contributory to and coincident with tumour growth. In regard to histogenesis, Ewing points out that the growth of hepatoma from hypertrophic liver cords has been demonstrated by many authors. It has, he adds, also been shown that there is a uniform gradation between nodular hyperplasia, multiple adenoma, and multiple carcinoma. These gradations may even be observed in the same liver, so that, as Muir has stated, there is no essential distinction between the comparatively benign and the atypical malignant forms of the tumour.

In 1931, M. J. Stewart[1] pointed out that primary carcinoma of the liver is a rare disease in white-skinned races. In Leeds during the period 1910 to 1931, among 12,800 autopsies 14 certain cases had been found (0·11%). Even if seven doubtful cases were added to this list the incidence was still only 0·16%. If only persons of thirty years of age and over were included, the figures were increased to 0·16% and 0·25% respectively. Stewart gave some figures to support the view that cirrhosis of the liver is a precancerous condition. He said that among 264 autopsies on persons with cirrhosis of the liver over thirty years of age (cases of the Banti type and all cases of post-necrotic or post-atrophic fibrosis were excluded), there were nine cases of primary cancer (3·41%). Among 7649 persons without cirrhosis and over thirty years of age, there were four cases of primary cancer of the liver (0·052%). In his series, if the slighter cases of cirrhosis were excluded there remained 124 persons over the age of thirty with cirrhosis and primary cancer of the liver, an incidence of 7·3%. Stewart produced from the literature evidence to support the view that a large majority of carcinomata of the liver, especially those of liver-cell type, arose in cirrhotic organs.

Reference to this subject has been prompted by the publication of an important monograph, "Primary Carcinoma of the Liver", by Charles Berman, of Maraisburg, Transvaal, South Africa.[2] Berman has carried out a good deal of research on this subject and reference to his work will be found in many publications. The monograph is a beautifully produced volume and is profusely illustrated with photographs and photomicrographs; there is a bibliography covering about 27 pages. Berman points out that primary liver cancer is very rare among all Western people, irrespective of whether they live in Europe, America, Africa, or elsewhere. The autopsy rate is 0·14% in Europe and 0·27% in America. The percentage frequency to all forms of cancer is 1·2% in Europe and 2·5% in America. On the other hand, primary liver cancer is relatively common among the Bantu races of Africa and it is here that Berman has done all his work. The autopsy rate for the Bantu is 1·1% and it is 0·76% for Oriental races. It is in regard to the percentage frequency of primary liver cancer to all other forms of carcinoma that the figures are most interesting. Among all Bantu races of Africa the percentage is 50·9; among young male Bantus employed on the Witwatersrand gold mines, the figure is 86·8%. Among Bantu females the figure is 5·1% and among the semi-Bantu 15·3%. Primary liver cancer is over six times more frequent in the east coast (Portuguese

[1] *The Lancet*, Volume II, 1931, pages 565, 617 and 669.

[2] "Primary Carcinoma of the Liver: A Study in Incidence, Clinical Manifestations, Pathology and Ætiology", by Charles Berman, M.D., B.Ch. (Rand.), with a foreword by Sir Ernest Kennaway, M.D. (Oxon.), D.Sc. (London), F.R.S., F.R.C.P., and an introduction by Henry Gluckman, M.R.C.S. (England), L.R.C.P. (London); 1951. London: H. K. Lewis and Company, Limited. 10" × 7½", pp. 180, with 83 illustrations. Price: 35s.

East Africa) Bantu than in the South African Bantus. The incidence of the disease, Berman states, among American Negroes, although higher than in Europeans, is very low by comparison with Africans and Orientals. Berman originally favoured the view that there was a racial predisposition towards the disease. With the increasing amount of evidence, however, that pre-cancerous and cancerous changes in the liver are readily induced by extrinsic agents, he has felt it necessary to modify this view. Berman points out that in any inquiry into the significance of racial susceptibility it can be assumed that a genetic factor may operate. But it cannot be expected that any such factor is common for races which are so different ethnically and which are so widely separated as are the races of Africa and the Orient. Further, the difference in incidence of the disease among the closely related Bantu races, together with the finding that the American Negro exhibits no increased incidence of the disease in relation to the white population, is an important indication that factors other than racial susceptibility must be present. In regard to what these factors may be, Berman suggests on the one hand relation to one or more agents provoking cirrhosis and, on the other, a relation to nutrition. In regard to cirrhosis he points out that the intimate relationship between that condition and primary liver cancer is not merely accidental—it was present in every one of the cases described by him. Cirrhosis has been produced experimentally by a number of toxic agents, but there is no proof that any of these is also responsible for the initiation of primary liver cancer in man. Berman mentions such conditions as chronic alcoholism, syphilis, helminth infestation and hæmochromatosis only to reject them as ætiological agents. He also mentions schistosomiasis, which has been given ætiological importance by some observers, but assembles a good deal of evidence in favour of its rejection. He thinks that greater importance in the evolution of cirrhosis and liver cancer is perhaps the influence of diet. He does not seem to be much impressed with the idea that chemical and bacterial toxins are responsible, but thinks that metabolic disturbances resulting from dietary imbalance or deficiencies are of greater consequence. He points out that liver damage in human beings has been demonstrated as due to food deficiency. Whether the main dietary error is the result of protein or vitamin deficiency, or of excessive carbohydrates or fats, has not, he states, been settled. He thinks that prolonged deprivation of first-class protein is perhaps the most important factor. In South Africa there is strong evidence that cirrhosis and other liver damage results from a generally deficient diet and not from the absence of any single food factor. Berman refers to work by Gillman and his associates, who have shown that pellagra, common among the Bantu, is accompanied by profound liver damage. Berman discusses this part of the subject at some length and his conclusion is that "possibly the distribution of liver cancer over a large part of the world depends upon a variable mixture of negative deficiency and positive carcinogenic factors". After further discussion of the action of chemical compounds of various kinds, he is compelled to reach the conclusion that more information is necessary. The general conclusion from his discussion on ætiology is that environmental factors, including cirrhosis-producing and carcinogenic agents, are responsible for pre-cancerous and cancerous states of the liver; and in man these probably act on a favourably prepared soil, the nature of which is apparently determined largely on a nutritional basis.

The end of this discussion must be inconclusive in spite of the fact that findings such as those recorded by Stewart on the one hand and by Berman on the other suggest that a solution might possibly be found. Perhaps findings such as those recorded by Berman may be used in general cancer research as well as in research into cancer of the liver. It may be of interest, though only in the field of conjecture, to conclude this discussion by recalling the views of Gillman (mentioned by Berman) in a book entitled "Perspectives in Human Nutrition".

We have long suspected that the high incidence of carcinoma of the liver in young male Africans is in some way bound up with the reticulosis and the dissociation of the androgen-estrogen secretions of the testis in a hypothyroidic subject. The frequency of gynecomastia in African males strongly suggests the presence of unantagonized estrogen. In rats and mice estrogen is known to excite mammary carcinoma which is alleged to be preventable by administering thyrotropin (Cramer and Horning, 1938). The presence of unantagonized estrogen, as evidenced by gynecomastia in males, as well as the depression of metabolism and the associated injury to the liver cells might well be three important links in the chain of events culminating in hepatic carcinoma. In this connection it should be mentioned that carcinoma of the liver is usually seen in Africans during the sexually active period of their lives.

ANAL CONTINENCE AFTER OPERATION ON THE RECTUM.

IF anal continence is to be retained after surgical operations involving the rectum, the surgeon must pay considerable attention to preserving the essential structures involved in the nervous and muscular mechanism of the rectum and anus. This was discussed in these columns on July 28, 1951, in the light of a paper by Goligher and Hughes, who particularly stressed the importance of the sensory innervation. A practical contribution in the same field has been made by John Devine and Rowan Webb,[1] of Melbourne, in their description of "a technical method by which a potentially dangerous or diseased mucosal layer of the rectum can be removed, with the muscle and nerve mechanism of the rectal wall left intact and its reciprocal action with the anal sphincters untouched"; the rectal muscle and nerve tube is relined with ileum. The devising of the method was prompted by the plight of a patient with familial multiple polyposis of the colon and rectum—an unhappy condition, often occurring in young patients and having a very considerable liability to malignant change. The two patients whose case histories are presented in the paper were a brother and sister afflicted with this condition who received benefit from the operation. The two procedures most commonly used for treatment of this condition, Devine and Webb point out, have definite disadvantages: total colectomy with excision of the rectum removes all the potentially malignant mucosa, but leaves the patient with a permanent abdominal ileostomy—an intolerable state for some patients; colectomy with ileorectal anastomosis leaves the patient still liable to malignant change. Devine and Webb's operation aims at overcoming these difficulties. It is performed by two operators, one making an abdominal approach, the other a rectal approach. The abdominal operator, working through a mid-line subumbilical incision, divides the terminal part of the ileum between clamps about nine inches from the ileo-caecal junction, mobilizes the distal part of the sigmoid colon and upper third of the rectum, and divides the bowel just above the recto-sigmoid junction. The other operator floats the rectal mucosa off the muscularis layer by injecting local anæsthetic and adrenaline solution into the submucosal plane, leaving two small "censor" areas of mucosa at the muco-cutaneous junction to retain the power of identifying the solid or fluid nature of the bowel contents; the mucosa is then dissected off as a complete tube and removed. A wide-bore rubber tube is passed up through the tube of rectal muscle and the functioning ileum is attached over its end with a stitch and withdrawn to the region of the anal canal. A short incision is made transversely on either side of the ileum through all its coats at about one inch from its end. The mucosa of the proximal lip of each incision is loosely approximated to the "censor" remnants of anal mucosa with silk sutures. This ensures viable mucosa at the site of anastomosis. The results in the two cases reported, from the point of view of anal function as well as of apparent cure of the familial multiple polyposis, have been encouraging. This ingenious surgical procedure seems to promise well for an unfortunate group of patients.

[1] *Surgery, Gynecology and Obstetrics*, April, 1951.

Abstracts from Medical Literature.

PHYSIOLOGY.

Mobilization of Red Cells and Oxygen from the Spleen in Severe Hypoxia.

K. KRAMER AND U. C. LUFT (*The American Journal of Physiology*, April, 1951) report that changes in spleen weight and in the hæmoglobin content of systemic blood were recorded during acute hypoxia in dogs under the influence of "Nembutal". Contraction of the spleen occurred regularly in these experiments. This response did not appear early, but was a terminal event immediately preceding respiratory failure. Loss in spleen weight during contraction coincided closely with an increase in systemic hæmoglobin content. During the refilling phase of the spleen in recovery from hypoxia, the same inverse relationship was evident when the systemic hæmoglobin value returned to the initial level. An estimate of the hæmoglobin concentration in stored blood based upon the amount of blood released by the spleen leads to the conclusion that the splenic stores consist almost entirely of packed red cells. Continuous records of the hæmoglobin content in the splenic vein showed very rapid changes in the final stages of hypoxia, with peak values twice as high as in arterial blood. During recovery the hæmoglobin level in the splenic vein was slightly lower than that in the artery, a fact signifying the retention of red cells at this time. During control periods, when air was breathed, spontaneous rhythmic fluctuations were frequently observed in the hæmoglobin content of blood in the splenic vein. During hypoxia the oxygen saturation of venous blood from the spleen remained consistently higher than that of arterial blood, and even increased when splenic contraction reached its peak. It is concluded that in the critical phase of hypoxia, the spleen of the dog releases large amounts of red cells with a relatively high oxygen content into the portal venous system.

Effect of Hypotonic Solutions and Mixtures with Homologous Blood on Blood Flow.

M. M. WINBURY, D. A. BEACH AND P. M. MICHIELS (*The American Journal of Physiology*, April, 1951) state that the intraarterial injection of distilled water is followed by a considerable augmentation of the blood-flow rate, a response which is not observed with isotonic solutions of sodium chloride, sodium bromide or glucose. Also certain vasodilator drugs appear to be more active when dissolved in water than when dissolved in isotonic sodium chloride solution. The authors have carried out experiments with dogs and report that distilled water injected intraarterially has a vasodilator action which can be attributed to its hypotonicity. Isotonic salt solutions and plasma are inactive. Aminophylline is a more effective vasodilator in distilled water solutions than in isotonic sodium chloride solutions. This appears to be a result of the combined action of water and aminophylline, which is additive in nature. The erythrocytes contain a vasodilator substance, released on rupture of the cell membrane. Intact cells have no effect. The dilator substance did not appear to be acetylcholine or histamine; it could be ATP. The suggested mechanism of the vasodilator action of water (and hypotonic solutions) is as follows: intraarterial injection of water results in local in-vivo hæmolysis; on hæmolysis, there is release of vasodilator substance (perhaps ATP) from the erythrocytes, which dilates the vessel.

Suppression of Spontaneous Breathing during Electrophrenic Respiration.

P. O. CHATFIELD AND S. J. SARNOFF (*The American Journal of Physiology*, October, 1950) state that during the application of electrophrenic respiration an inhibition of spontaneous breathing can invariably be achieved in man and almost invariably in anæsthetized experimental animals. As this reflex inhibition is of clinical interest in bulbar poliomyelitis they have investigated the condition in dogs. They report that the immediate inhibition of spontaneous breathing during electrophenic respiration in dogs under the influence of "Nembutal" is favoured by increasing the rate of artificial respiration, increasing its depth (higher voltage applied to phrenic nerve), and increasing the duration of inspiration in any given respiratory cycle. The inhibition depends at least in part on afferent impulses in the vagi. Hypercapnia, which is known to increase the excitability of the respiratory centre, elevates the threshold for reflex central inhibition during electrophrenic respiration. Inspiratory intercostal activity is also inhibited during electrophrenic respiration. It is concluded that the immediate suppression of spontaneous breathing during electrophrenic respiration is due to inhibitory vagal afferent impulses, which prevent the spontaneous discharge of the respiratory centre. In addition to the usual suppression of spontaneous respiration, reflex excitation of the inspiratory centre can be achieved by producing an excessive diaphragmatic contraction. Producing an active descent of one leaf of the diaphragm by stimulation of a phrenic nerve seems to be a more effective stimulus for inhibition of spontaneous respiration than inflation of the lungs by positive pressure. This would suggest the operation of factors other than those concerned solely with simple distension of the pulmonary parenchyma. The clinical implications of the results are discussed. It is pointed out that prolonging the duration of inspiration in any one cycle should more effectively inhibit spontaneous respiration while not affecting ventilation to any great extent.

Toxicity of Sea Water.

C. B. ALBRECHT (*The American Journal of Physiology*, November, 1950) reports that the lethal dose of sea water or of isosmotic sodium chloride solution for 50% of rats, mice and guinea-pigs when given the fluid by single intraperitoneal injection is 16 ± 2 (standard deviation) *per centum* of the body weight. The LD_{50} of molar sucrose solutions for these species under the same conditions is less than half the LD_{50} of equiosmolar salt solutions. The LD_{50} of sea water given by stomach tube to rats in divided doses at half-hourly intervals is essentially the same as when given by intraperitoneal injection. More gradual administration increases the total LD_{50}. The lethal chloride concentration of plasma is uniform for all methods of administration. Dogs and seals retain more sea water by the stomach if it is given in repeated small doses (0·33% of body weight) than if given in a single large dose (3·3% of body weight). Vomiting of the sea water is due to gastric irritation, not merely to distension by fluid. The total dose of sea water required to kill seals when given intravenously varies with the infusion rate, but is of the order of 4% to 9% of body weight. Seals appear to be no more resistant to the effects of sea water than are other mammals. They do not excrete its salts any more concentratedly in urine. Sea water may kill animals through cellular dehydration, while extracellular fluid volume is increased. But urea solutions probably kill without producing cellular dehydration. The central nervous system is believed most susceptible to tissue damage by sea water. The lethal dose of sea water for mammals is decreased by previous shortage of body water. Rats can be temporarily rendered more resistant to ordinarily lethal doses of sea water by administering repeated sublethal doses (adaptation).

Forelimb Regeneration in the Newt and Sensory Nerve Supply.

R. L. SIDMAN AND M. SINGER (*The American Journal of Physiology*, April, 1951) report that regeneration of the forelimb of the newt, *Triturus viridescens*, requires the presence of nerve fibres at the amputation surface, otherwise growth does not proceed. The sensory component can accomplish this growth stimulation in the absence of all motor fibres. Experiments described in the present work show, moreover, that the isolated sensory supply will stimulate regeneration of the limb even when the dorsal root is cut proximal to the ganglion, with resultant interruption of all central connexions of the sensory neurons. Therefore, the growth-stimulating action of neurons must arise in the cell of innervation itself and not in another nerve cell for transmission to the final neuron. This fact and the observation that sensory neurons effect a peripheral response, in contrast to a central one as ordinarily observed for sensory impulse conduction, emphasize that the growth-stimulating action of nerves in regeneration of the limb is probably independent of impulse conduction.

BIOCHEMISTRY.

Alloxan Diabetes.

S. CHERNICH AND I. CHAIKOFF (*The Journal of Biological Chemistry*, January, 1951) have compared the utilization of glucose and fructose, their carbons equally labelled, with radioactive carbon, and of sodium acetate, with both carbon atoms labelled, in liver slices prepared from normal and alloxan-diabetic rats. The conversion of the glucose to both carbon dioxide and fatty acids was depressed in the diabetic liver. The oxidation of the fructose to carbon dioxide proceeded at normal rates in the diabetic liver, but its conversion to fatty acids was depressed. The labelled acetate was oxidized readily to carbon dioxide by

the diabetic liver, but its conversion to fatty acids was impaired. The authors state that these findings indicate the existence of two metabolic blocks in the diabetic liver. The first is concerned with the conversion of glucose to fructose-6-phosphate. The second involves the conversion of a "2-carbon-like" intermediate to fatty acids.

Diabetes.

R. O. BRADY AND S. GURIN (*The Journal of Biological Chemistry*, December, 1950) have reported that although liver slices from normal rats and cats readily convert labelled acetate to long chain fatty acids, the livers of alloxanized rats and pancreatectomized cats are relatively incapable of carrying out this process. On the other hand, the conversion of acetate to cholesterol by livers of alloxanized rats and pancreatectomized cats is apparently unimpaired, although this process may be inhibited when the diabetes is sufficiently prolonged and severe. The addition of insulin, glucose, fructose-6-phosphate, oxalacetate, or keto-glutarate to the incubating medium fails to reestablish fatty acid synthesis in liver slices from diabetic animals. The accumulation of liver fat in diabetic animals may be attributed mainly to increased transport from extrahepatic sources.

Tryptophane-Niacin.

WILLIAMS *et alii* (*The Journal of Biological Chemistry*, December, 1950) have shown that dietary tryptophane seems to play a much more important role than dietary niacin in the synthesis of rat liver pyridine nucleotides. In adult rats dietary niacin stimulates synthesis of the pyridine nucleotides, although the effect is much less pronounced than that of dietary tryptophane. In young growing rats dietary tryptophane is necessary for the synthesis of the liver pyridine nucleotides, whereas dietary niacin appears to have no effect in maintaining the level of these liver coenzymes.

Fluoride.

W. F. NEUMAN *et alii* (*The Journal of Biological Chemistry*, December, 1950) have investigated the mechanism of fluoride deposition in bone by means of isotopic exchange, ion competition and column techniques. They have shown that fluoride replaces either hydroxyl or bicarbonate ions in the surfaces of the mineral phase.

Calcium.

H. E. HARRISON AND H. C. HARRISON (*The Journal of Biological Chemistry*, January, 1951) have studied the rate of absorption of calcium administered as calcium chloride solution containing radioactive calcium in rhachitic, vitamin *D* treated and control rats. The most rapid rate of absorption of calcium was found to occur within the first two to four hours after its administration. This absorption was from the proximal portion of the small intestine, and the amount of calcium absorbed during this interval was not influenced by vitamin *D*. Analysis of the contents of separate portions of the small intestine showed that at the end of four hours little radio-calcium remained in the proximal two-thirds of the small intestine, and the major portion of the unabsorbed radio-calcium was found in the distal one-third of the small intestine and in the large intestine. Absorption of calcium from the distal portion of the intestine was found in rats receiving vitamin *D*, but not in untreated rhachitic rats, except in animals in which the intestinal tract had previously been emptied of calcium by the feeding of a calcium-free diet. The results suggest that the effect of vitamin *D* in increasing the efficiency of absorption of calcium is observed only under conditions in which the calcium of the intestinal contents is poorly soluble. These experiments indicate also that calcium can be absorbed from the distal part of the intestine.

Nitrogen Balance.

W. C. ROSE *et alii* (*The Journal of Biological Chemistry*, January, 1951) have shown that threonine is an indispensable dietary component in human subjects. Its removal from the food induces a pronounced negative nitrogen balance, which is relieved by the return to the diet of the missing amino acid. In contrast to the role of threonine, the exclusion of histidine from the ration exerts no demonstrable effect. This observation, which has been confirmed in many cases, shows that histidine is not necessary for the maintenance of nitrogen equilibrium in normal adult men.

Insulin.

W. C. STADIE *et alii* (*The Journal of Biological Chemistry*, January, 1951) have found that if isolated hemidiaphragms from normal and hypophysectomized rats were exposed for one minute to insulin at varying concentrations, insulin was bound to the tissue. It was found that the subsequent effect of the bound insulin, when measured by extra glycogen synthesis over the respective controls, was much greater in the diaphragms from hypophysectomized rats. This was particularly striking when the concentration of insulin during the preliminary period was low. The increased response to insulin by diaphragms from hypophysectomized rats was also found when the diaphragms were equilibrated for ninety minutes in a medium containing low concentrations of insulin and high concentrations of glucose. The authors state that these experiments offer a single explanation of the known hypersensitivity of the hypophysectomized rats to insulin: in the normal rat a pituitary factor is present which diminishes the binding of insulin to muscle tissue; this factor is eliminated by hypophysectomy; hence insulin combines maximally, and the insulin effect on glycogen is maximum.

Serum Protein.

C. GERBI (*Archives of Biochemistry and Biophysics*, March, 1951) has reported that in normal rabbits, under "Nembutal" anæsthesia, the total protein and albumin content of the arterial blood serum are significantly higher than the same fractions of the renal venous blood serum. This condition is reversed in the rabbits after removal of more than 15 millilitres of blood per kilogram. Renal innervation plays a role in the regulation of the protein concentration in the renal venous blood after hæmorrhage. No significant difference of protein fractions in the arterial and renal venous blood serum has been observed in a series of rabbits with experimental renal hypertension. Parallel estimations of colour intensity of previously injected Evans blue and of the protein fractions (by electrophoretic and turbidimetric methods) in the arterial and venous blood specimens of normal rabbits corroborate the possibility of a renal mechanism of albumin storage.

Scurvy.

W. ROBINSON (*The Journal of Biological Chemistry*, December, 1950) has determined the concentration of collagen in skin, liver, lung, kidney, spleen, costo-chondral junctions and teeth of normal guinea-pigs and of acutely and chronically scorbutic guinea-pigs. The collagen concentration of the tissues of scorbutic guinea-pigs was in no case appreciably lower than that in normal animals. This suggests that if collagen was not maintained either the amount destroyed was small or the degradation of structure was slight.

Glutathione.

E. K. B. ILLING *et alii* (*The Biochemical Journal*, May, 1951) have determined the total and reduced blood glutathione content in 20 normal and 39 diabetic persons. A significant reduction in the glutathione level was found only in the diabetics with severe ketosis. This reduction may be related to the retention of base in diabetic ketosis. The glutathione content of the blood has been compared with the differences between the concentration of "true" glucose and total reducing substances. Glutathione does not always account for this difference, a fact which suggests that other reducing substances, not yet identified, must be present in the blood.

Zinc.

V. SADARIVAN (*The Biochemical Journal*, May, 1951) has investigated the effects of supplements of zinc at levels of 0·5% and 1·0% on the livers and bones of rats. Zinc supplement caused a pronounced lowering of the fat content of livers of rats fed on a diet on which control rats developed fatty liver. Zinc appears to act as a lipotropic factor in the concentrations studied. Zinc also interferes with development and mineralization of bones.

Hyaluronic Acid.

M. D. SCHOENBERG *et alii* (*Archives of Biochemistry*, February, 1951) have shown that X irradiation causes a reduction in viscosity of vitreous and umbilical cord hyaluronate solutions and a continuing loss in viscosity after cessation of the irradiation. X irradiation causes a pronounced decrease in the average molecular weight. The half-time values for irradiated hyaluronate are greater than those for non-irradiated hyaluronate. There is a decrease in the activity of X-irradiated hyaluronidase solutions.

Vitamin A.

A. F. BLISS (*Archives of Biochemistry and Biophysics*, April, 1951) has shown that vitamin *A* is reversibly dehydrogenated to vitamin *A* aldehyde (retinine) in isolated retinal rods and in liver extracts containing alcohol dehydrogenase and coenzyme I. This reaction is probably involved in the utilization of vitamin *A* for the regeneration of bleached visual purple

British Medical Association News.

SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association, in conjunction with the Victorian Branch of the Australian Dental Association, was held on June 6, 1951, at the Lecture Theatre of the Royal Melbourne Hospital.

Oral Infection in Relation to Systemic Disease.

DR. MORRIS C. DAVIS read a paper entitled "The Role of Dental Sepsis in Systemic Disease" (see page 349).

PROFESSOR A. B. P. AMIES read a paper entitled "'Out of Focus'—Medicine or Dentistry?" (see page 353).

DR. MICHAEL KELLY supported Professor Ward's statement, quoted by Professor Amies, that the septic focus theory was difficult to prove. He said that evidence which appeared to support it was capable of other interpretations. Statistical data supplied in 1939 by Vaizey and Clark-Kennedy, and in 1940 by Reimann and Havens, indicated that removal of teeth and tonsils did not affect the course and the incidence of anæmia, dyspepsia, rheumatism and other systemic disorders. The belief that teeth might give rise to general disease was by no means new; Benjamin Rush, of Philadelphia, had mentioned it as a widely held belief 150 years earlier. It had been said that the multiplication of hypothetical toxins was one of the cardinal sins of medicine. Practitioners were acquainted with tetanus toxin and with a few other bacterial exotoxins, but there was no evidence that locally innocuous non-specific infections generated toxins. Dr. Kelly agreed with Dr. Davis that the majority of illnesses could not be diagnosed by the present methods; they were not classified in the text-books and thus could not be taught to students, and the practitioner had to learn what he could of them when he went into practice. There was no doubt that chronic rheumatic disorders were sometimes precipitated by infections, but there was no evidence that their persistence was due to infection, or that they might be relieved by eradication of a focus. An operation occasionally induced a complete remission of rheumatoid arthritis; no doubt those present had all encountered such cases after different kinds of operation. Dr. Kelly said that when he was disabled once with polyarticular pains which followed scarlet fever, all pain and stiffness vanished for thirty-six hours after tonsillectomy, and then returned with increased intensity. Hench had listed a large number of operations and procedures which had induced remissions in rheumatoid arthritis, and he believed that the common factor was the general anæsthetic. The effect was to stimulate the adrenal glands to produce cortisone. More frequently, however, the patients were worse after operation. If the septic focus theory was once admitted, a number of unnecessary operations might be performed in succession on an individual patient. They should remember what Paman wrote to Sydenham about over-treatment of rheumatic patients: "To suffer at the hands of God is enough; no need that the physician torture him as well."

A MEETING of the South Australian Branch of the British Medical Association was held at the Repatriation Hospital, Springbank, on June 21, 1951, the President, DR. C. O. F. RIEGER, in the chair. The meeting took the form of a series of clinical discussions by members of the medical and surgical staff of the hospital. Part of this report appeared in the issue of September 8, 1951.

Dissecting Aneurysm.

DR. D. L. WILHELM discussed the case of a male patient, aged fifty-seven years, who had been admitted to hospital on May 4, 1951, as an emergency. The patient was confused and unable to answer questions, although he did not look unduly distressed. His pulse rate was 40 per minute, his respiratory rate 18 per minute, and his temperature 97·4° F. On examination, the patient felt cold and his extremities were cyanosed. Clinically his lungs were normal anteriorly. The cardiac sounds were slow (40 per minute at the apex) but regular. A to-and-fro murmur was heard over the base of the heart. The blood pressure reading was 140 millimetres of mercury (systolic) and 70 millimetres (diastolic). The abdomen was clinically normal. There were healed ulcers around the ankles and exaggerated, but equal, knee and ankle jerks. The plantar reflexes were flexor. The patient died six and a half hours after his admission to hospital.

Autopsy was performed on May 7. A dissecting aneurysm involved the whole length of the aorta, but, in general, the dissection involved only about two-thirds of the aortic circumference. Proximally the dissection extended beyond the base of the aortic valves, and distally it reached the proximal three inches of both common iliac arteries. Situated 6·5 centimetres above the aortic ring and on the right lateral margin of the aorta, was a horizontal intimal rupture 1·7 centimetres long; 2·5 centimetres above the right posterior aortic cusp was an oblique adventitial tear 0·4 centimetre long. The pericardium contained 10 ounces of fluid blood and blood clot. The liver, lungs, spleen, kidneys and small bowel were congested; the basal cerebral vessels showed moderate atheroma; there were two cavernous angiomata, 1·5 to 2·0 centimetres in diameter, near the lateral margin of the dome of the right lobe of the liver. The cause of death was a dissecting aneurysm of the aorta, with terminal hæmopericardium.

Dr. Wilhelm demonstrated the autopsy specimen and microscopic sections of the aortic wall at the site of the intimal rupture. Microscopically the aortic wall showed a linear zone of necrosis at the outer margin of the media and extending through the media and intima into the lumen. In the middle third of the media were small foci of early necrosis which had spared bundles of collagen.

In discussing the case, Dr. Wilhelm referred to the following clinical and pathological features of dissecting aneurysms, largely based on the Medical Research Council Special Report Series, Number 193, by T. Shennan, published in 1934. Of 290 cases, 190 (65%) had occurred in males and 100 (35%) in females. The age incidence in Shennan's cases varied from the second to the tenth decades, but the maximal incidence occurred in the fifth, sixth and seventh decades; 75% of the male subjects and 65% of the female were in the age group forty to seventy years. The chief characteristic of the clinical symptoms was their variety, but the onset mostly was sudden and acute—most commonly, sudden intense pain in the thorax and/or abdomen. Occasionally there was accompanying pain in the side of the head or neck, or extending to the limbs. The intense pain usually was followed rapidly by collapse, dyspnœa, or even loss of consciousness, leading to death within minutes, or a variable interval of time.

Shennan had stated that physical signs of cardiac disease gave little assistance in diagnosis, that such signs were reported in comparatively few cases, and that cardiac murmurs were not constant in type. On the other hand, Bauersfeld, writing in *Annals of Internal Medicine* in 1947 (Volume XXVI, page 873), had stressed the sudden appearance, with dissecting aneurysm, of an aortic diastolic murmur with or without a systolic murmur; he considered that those murmurs were due to distortion of the aortic ring by dissections involving that part of the aorta.

He also emphasized the maintenance of normal, or even raised, blood pressure readings after the acute catastrophe had occurred. The most common radiological feature was progressive deformity of the supracardiac shadow.

Dr. Wilhelm said that in Shennan's collected cases, approximately one-third of the patients had lived for not more than fifteen minutes, another one-third had survived for one to twenty-four hours, and the remaining one-third had lived for one day to five weeks. In cases of recent dissection, the commonest cause of death was intrapericardial hæmorrhage. Of 218 cases of recent dissection, in 83% involvement of the intrapericardial aorta had occurred; in 70% of these the patient died of hæmopericardium. Less commonly, terminal hæmorrhage might occur into the pleural cavities, the peritoneal cavity, the mediastinum, the pulmonary artery or even the auricular septum, leading to heart block. Cardiac failure was the terminal event in a minority of recent dissections, but complicated about one-half of old "healed" dissections.

The typical autopsy lesions were hæmopericardium, or hæmorrhage elsewhere, with dissecting aneurysm and ruptures of the intima and adventitia of the aorta. The dissection might be only a local sac in the ascending aorta, but usually a sheath-like dissection occurred for a varying distance in the media—the shortest dissection recorded by Shennan had been one inch in length; the longest dissecting aneurysm reached from the origin of the aorta to the popliteal arteries. Shennan had reported that 30% of the dissecting aneurysms were limited to the thoracic aorta, and a "double aorta" was present in 15% of cases. The intimal rupture most frequently was just above the aortic valves, possibly owing to the effects of diastolic recoil. The dissection always occurred in the media, and progressed for a variable distance without secondary rupture, either

through the adventitia or back into the lumen. Most frequently, secondary rupture was through the adventitia usually under cover of the right auricle or in the recess between the aorta and pulmonary artery.

The probable pathogenesis of dissecting aneurysm was that disease of the media of the aorta led to rupture of *vasa vasorum* and hence a medial hæmatoma, which split the wall and eventually ruptured through the remaining media and intima into the lumen. Through that rupture, blood could force its way and dissect the aortic wall. Pronounced medial degeneration of undetermined nature was common, especially in the outer third of that layer. Those lesions often showed a homogeneous and hyaline or "mucoid" appearance. Bauersfeld had claimed that stenosis or occlusion of the aortic isthmus predisposed to dissecting aneurysm, especially in female subjects, under the age of forty years, during pregnancy. Shennan had found only six of 218 cases of dissecting aneurysm commencing at the bases of atheromatous ulcers. Trauma, physical strain and aortitis of syphilitic or rheumatic origin did not appear to cause dissecting aneurysm; hypertension probably was only of secondary importance, acting by increasing the systolic stretching and the diastolic recoil of the aorta.

DR. D. A. HICKS described a reported case of aortic aneurysm in a man with previous aortic stenosis; at the onset, the patient complained of a bubbling sensation in his chest. Subsequently the patient died and autopsy was carried out.

DR. A. B. ANDERSON mentioned a previous case of dissecting aneurysm diagnosed during the patient's life, in the Repatriation Hospital, Springbank.

Emphysema and Spontaneous Pneumothorax.

DR. C. D. SWAINE presented a man, aged twenty-six years, who had first come under the notice of the chest division of the hospital in April, 1950, when he was admitted to hospital with a left spontaneous pneumothorax. He gave a history of five previous attacks—the first in 1942 on the right side. Subsequently he had had two on the right and two on the left. On May 2, 10 minims of 10% silver nitrate solution had been injected into the left pneumothorax space. The patient developed a sero-fibrinous effusion. Air and fluid were removed, and his lung gradually reexpanded. He was allowed to go home on May 20, but he returned on June 1 with a right spontaneous pneumothorax. Thoracotomy with excision of emphysematous bullæ was performed on June 22. Recovery from the operation was uneventful, but the patient stated that his breathlessness had not improved.

Dr. Swaine's second patient, a man, aged forty-eight years, had been first examined at the chest division of the hospital on June 2, 1950. He had been admitted to the orthopædic ward for treatment of spondylitis. He gave a history of having had a normal chest X-ray film on his enlistment in 1940. The members of the chest division were satisfied that this film was normal. During his service he began to complain of gradually increasing shortness of breath leading to his being made "B" class in 1944 because of "bronchitis and emphysema". The discharge micro-film in 1945 showed increased translucency at both apices. After discharge from the services he worked as a painter, and, apart from backache, his only complaint was dyspnœa on exertion. He had neither cough nor sputum. Physical examination of the patient showed decreased movement and hyperresonance over both upper lung fields. After bronchogram was performed, a right upper lobectomy was performed on September 21, 1950. Dr. Swaine said that since that time the patient's breathlessness had not become less and his further treatment had not been decided.

In his discussion of the two cases, Dr. Swaine made mention of the classification of lung cysts suggested by Dr. J. Hayward, of Melbourne, in his article in the centenary *Clinical Reports of the Royal Melbourne Hospital.* He also referred to the extreme pain occasioned by the injection of silver nitrate and the objection to local removal of diseased tissue, since the disease was general throughout the lungs, and the patients who had been treated surgically were not improved symptomatically by operation.

DR. D'ARCY SUTHERLAND said that while the cases under discussion represented types of emphysema which were amenable to surgical treatment, he would stress the fact that cases in this group formed a very small proportion when considered in relationship to emphysema as a whole. He stated that he had experienced considerable difficulty in deciding which cases could be treated surgically. A patient suffering from any of the localized forms of emphysema nearly always had generalized lung changes as well; hence the assessment for that reason alone was difficult. Dr. Sutherland then gave other instances of conditions in which treatment was surgical, such as the congenital localized form of emphysema occurring in children; in the two cases which he had treated by lobectomy the patients had had the disease strictly localized to the lobe concerned. He also had had one case of an emphysematous cyst or bulla which during a period of eight years' observation had increased from the size of a poor-man orange to one which occupied the whole hemithorax. That was in a man, aged forty-two years, who had been greatly benefited by lobectomy and reexpansion of the other lobe to fill the pleural space. Dr. Sutherland said that before Dr. Claggett, of the Mayo clinic, visited Australia, he (Dr. Sutherland) had always considered that chemically induced pleurisy was the treatment of choice for repeated spontaneous pneumothorax. Dr. Claggett had put forward the view that it was more rational to perform thoracotomy and deal with any localized condition found to be present; as always after thoracotomy, complete obliteration of the pleural space could be assured.

DR. ROGER ANGOVE said that there were two points that he would like to stress in the treatment of spontaneous pneumothorax in view of the fact that the two patients presented had been treated by thoracotomy and lung resection. The first was that by far the majority of patients presenting with non-tuberculous spontaneous pneumothorax had either generalized or localized emphysema. In that regard the teaching of Brock was pertinent, in that, if the emphysema was localized, it was usually indicative of local pulmonary disease, and could then be dealt with by segmental or lobar resection as indicated. If, however, it was generalized emphysema, then local resection of the offending bullæ was not indicated, as in all probability others would rupture later; it was in those cases that the production of chemical pleuritis was of some help. Hence a preliminary thoracoscopy was often of help in deciding if thoracotomy would assist. The second point was that in the induction of chemical pleuritis it was most desirable to use only that foreign substance which was sufficiently irritant to cause a degree of pleuritis adequate for adherence of the parietal and visceral pleura. Hence, one usually commenced with olive oil, "Gomenol" or oil of arachis, and only finally in a stubborn case was it necessary to resort to 10 minims of 10% silver nitrate solution. To use the latter solution in every case would in many cases produce a most severe reaction which would only bring the method into disrepute. In any case of recurring spontaneous pneumothorax it was thus obligatory to establish as closely as possible the underlying pathological condition prior to deciding on medical or surgical treatment.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

DISEASES OF THE RECTUM.[1]

[*Australian Medical Journal,* Volume I, 1856.]

From a lecture to the Victorian Medical Society on diseases of the rectum by James McNicoll, Esq. (October 27th, 1855).

Foreign bodies introduced into the rectum by accident or design occasionally require to be extracted. This is generally accomplished by means of the forceps, although a surgical operation is sometimes required when the foreign substance is very large or very irregular in shape. In a case which occurred in Paris, some time since, a pig's tail had been introduced with the thick end uppermost into the rectum of a woman of the town by a medical student whom she had offended. The tail had been prepared for the purpose, the bristles being cut short: the consequence was that any attempt to remove it gave rise to the most excruciating pain, the rectum being inflamed. Death in this instance must have taken place had not a very simple but ingenious plan been adopted for its extraction. The

[1] From the original in the Mitchell Library, Sydney.

surgeon, having tied a long cord to the end of it, introduced a tube over it, and without pain or difficulty removed both together.

A case is also recorded of a surgeon being called on to extract from the rectum of a boy a wooden dragoon and his horse, a toy which his playmates had great trouble to introduce, and he had to dismount the dragoon before extraction, that is, he broke it with a strong bent forceps for extracting polypi.

In conclusion, I would remark that it is fortunate for those suffering from these diseases in this Colony that we have as yet no advertising quacks who kindly devote their time and talent solely to the treatment of diseases of the rectum, like some of the special fraternity in London and elsewhere—persons popularly known as "fistula doctors". I am inclined to think that these gentry have had their hands greatly strengthened by the indifference shown to patients of this class by many respectable practitioners, who often make too light of the matter, and appear loath to investigate other than extreme cases. Such conduct, while it is a clear dereliction of duty on the part of the surgeon, often condemns the patient to much unnecessary suffering, or, far worse, induces him to seek assistance in a quarter where he may think himself fortunate if he escapes with his life—minus his purse.

Correspondence.

PETHIDINE SHOCK.

SIR: Mrs. E.C., aged twenty-three years, a *primigravida*, whose due date of confinement was March 18, 1951, was admitted to the Colac Hospital on February 27, 1951, with a blood pressure of 140 millimetres of mercury, systolic, and 100 millimetres, diastolic; the amount of albumin in her urine was "one-sixth". The patient had suffered from "blood pressure" of unknown causation at the age of sixteen years, and from pyelitis some years before. Between August 17, 1950, and February 27, 1951, her blood pressure had ranged between 140 and 160 millimetres of mercury, systolic, and 76 and 100 millimetres of mercury, diastolic.

The albuminuria cleared on the patient's admission to hospital, but her blood pressure remained elevated. On March 15, as the systolic blood pressure had risen to 170 millimetres of mercury on several occasions, 100 milligrammes of pethidine were given subcutaneously at 1 p.m., prior to rupture of the membranes. At 1.15 p.m., before artificial rupture of the membranes was commenced, the patient became collapsed, cyanosed and pulseless. The position of the uterine fundus was marked on the skin. An hour later the patient's condition had improved, but the fœtal heart rate was very slow and the uterine fundus had risen two inches.

A pre-operative diagnosis of concealed accidental hæmorrhage was made, and a lower segment Cæsarean section was performed. The placental "infarcts" usually found in hypertensive patients were present, but there was no placental separation or hæmorrhage. Mother and baby made normal progress.

The most reasonable diagnosis in this case is, I think, pethidine sensitivity. A case of pethidine shock was reported recently in the *British Medical Journal*, but I am unable to supply the reference.

Yours, etc.,

GRAEME SALTER.

10 Chapel Street,
Colac,
Victoria.
August 9, 1951.

ANURIA.

SIR: I was very interested in the article on anuria by Dr. James Isbister, published in THE MEDICAL JOURNAL OF AUSTRALIA, July 14, 1951. He gives a full and comprehensive account of the various causes of anuria, but does not sufficiently emphasize their relative frequency; the result being that many practitioners reading the article might come to the conclusion that the majority of cases of this condition encountered in practice are due to a more serious condition than is actually the case. The physician probably encounters a greater number of the more serious conditions summarized by him under the headings pre-renal and renal causes, but the majority of cases of so-called anuria seen by the surgeon come under the heading of post-renal obstruction. Many of these cases have frequently been incorrectly referred to in the past as cases of reflex anuria, a term which I consider in the light of present-day knowledge should not be used. Under the heading of renal causes, Dr. Isbister has placed conditions such as renal colic, urinary instrumentation and operation, and operations on other organs. There is little doubt that in most of these conditions where suppression of urine occurs, the real cause is obstruction of the lower ends of the ureters by small calculi or by an agglomeration of crystals occurring in an acid and highly concentrated urine. In an article which I contributed to THE MEDICAL JOURNAL OF AUSTRALIA, December 7, 1940, I described some of these cases. It was only after operating on a number of them and seeing the tensely distended pelves and ureters that I realized that the suppression of urine was due to a mechanical block in the lower ends of the ureters. None of these cases had had any of the sulphonamides, as they all occurred before these drugs came into general use, and I came to the conclusion that the obstruction must have been due to either uric acid or oxalate crystals which had been deposited in a highly concentrated urine following upon a too prolonged deprivation of fluid before operation, and insufficient fluid after operation. We now know that after the administration of sulphonamides, a deposition of crystals of an acetylated compound of the drug used may lead to a blocking of the ureters and so cause complete suppression of urine. It is not very uncommon to get a blockage of the ureter on one side following shortly after some simple operation, and usually associated with colic and the passage of blood-stained urine, and where a pyelogram will show that one kidney is not functioning. If, however, a simultaneous obstruction occurs on both sides, the case is commonly, although incorrectly, referred to as one of anuria.

Where the obstruction of the ureters is removed early, the cure will be speedy and complete, and one simple and often successful method of doing this is by the intravenous administration of an isotonic solution of sodium sulphate. The administration of solutions intravenously may do harm if delayed until the patient is on the verge of uræmia, but can only do good if given early in these cases of suppression due to obstruction in the ureters. Where the obstruction is not removed by any of the usual methods tried, the patient frequently recovers without any special treatment beyond giving plenty of fluids by mouth. Where the patient dies as the result of uræmia, post-mortem evidence of the obstructed ureter will probably not be found, because the relaxation of the spasm of ureters and kidney pelves which occurs at death would allow any obstructing crystals to pass on into the bladder, where, no doubt, they would be found if carefully looked for.

Yours, etc.,

P. L. HIPSLEY.

Sydney,
August 1, 1951.

A MORE REALISTIC VIEW OF TUBERCULOSIS.

SIR: There is much of value in Dr. Short's observations in this matter. Perhaps he was a little unfortunate in the use of the word "dabbling", which conveys a rather derogatory impression. His criticism included various official health agencies, as well as medical practitioners and voluntary associations.

X rays are one of the most valuable aids in the diagnosis of pulmonary tuberculosis. For the fullest value to accrue from this method, it is necessary that the radiography shall be of the highest standard and that cases showing abnormality shall be subjected to full investigation. To save the patient's feelings, the latter should be done at the earliest time possible and should be done by someone who is fully competent to do it.

Dr. Short's suggestion for stationary clinics attached to country hospitals is very good. The trouble in this is to provide expert opinion to assist in the diagnosis of difficult cases. Travelling clinics might provide the answer; but delay seems inevitable, and this is not good for the "suspects'" mental ease.

It seems to be accepted that official health agencies are fair game for criticism from all and sundry. What is not so generally recognized is that governments, no matter how enlightened and willing, cannot eradicate tuberculosis by Act of Parliament. This needs a concerted effort by all concerned, governments, medical profession and people alike.

It was for this purpose that the Australian Tuberculosis Association was established. In many countries, and I need mention only England, Canada and the United States of America, it is accepted that the best results are obtained by the combined efforts of official and voluntary health agencies. It is not easy, and perhaps not necessary, to draw a sharp line of demarkation between the functions of these two bodies. The Australian association discourages its State divisions from entering the fields of diagnosis and treatment, which it considers are in the main government functions. But there are other ways in which voluntary associations can assist, and especially in securing as far as possible the cooperation of the profession and the people.

It is a little hard to suggest that the profession is "dabbling" in tuberculosis. In the control of this disease, as of any other infectious disease, the general practitioner is in the forefront of the campaign. Without his enlightened help, any efforts at control are likely to be unsuccessful.

Side by side with case-finding efforts, there should, of course, be provision for the medical treatment and economic relief of "cases" found. Without these, case-finding efforts on a large scale are likely to fall into disrepute.

Yours, etc.,

163 North Terrace, Adelaide,
August 30, 1951.

D. R. W. COWAN.

RESEARCH IN PSYCHIATRY.

SIR: In THE MEDICAL JOURNAL OF AUSTRALIA for August 18, 1951, page 213, appears a lecture by John F. J. Cade: no qualifications such as might justify calling him "Dr. Cade" follow his name. A large meed of praise and of thanks is due to him for much instructive and well-expressed information. Nevertheless it seems desirable to remark a *non sequitur*, namely, that implied in the words, "this denial of freewill and hence of . . . responsibility". It is indeed commonly accepted and asserted that psychic determinism destroys responsibility (that is, liability to be called to account), but that this is false was clearly shown by two brilliant British psychologists and moralists, Thomas Hobbes and David Hume.

In fact determinism affords a logical basis for the employment of praise, blame and penalty as motives for the training of character, the reformation of conduct and the prevention of crime.

Yours, etc.,

131 Macquarie Street, Sydney,
August 25, 1951.

GUY GRIFFITHS, M.A., M.D.

SIR: In reference to the statement regarding certification by Dr. Cade in the Beattie-Smith lectures, I would like to point out that he is looking at it entirely from the official angle and not as one who may some day have to undergo the stigma—it is still very much of a stigma—of certification. Why not do everything to ease the burden both for the patient and relatives, by deferring, at least until after treatment, certification until hope is completely gone?

As a medical expert has put it:

> Unless diagnosis makes absolutely certain that a person's behaviour is due to ill development or destruction of his brain no man should be certified a lunatic. If necessary he should be certified as one who is behaving as if he were a lunatic and he should then be sent to a different hospital for observation. He ought to be given the full benefit of every doubt. When a person is suffering from any disease other than disease of the brain he is never sent to a home for incurables if there is any glimmer of hope, and the asylum or even the modern hospital for mental diseases has for the layman at least the same implication. On being certified and entering it, he is confirmed in his fears that he is incurable.

And as regards being able to write to the Governor, cabinet ministers and judges, how many patients know of such a privilege?

I have read where a certain other progressive superintendent of a mental hospital makes a point of telling all new arrivals why they are in hospital and also explaining as clearly as possible under the circumstances, the legal position of the patient, and how if they behave and improve they will progress to a better ward and so on.

I wonder does Dr. Cade do that?

Yours, etc.,

Brisbane,
August 28, 1951.

Ex-"VOLUNTARY BOARDER".

RESULTS OF SUBTOTAL GASTRECTOMY FOR PEPTIC ULCER: A REVIEW OF SIXTY CASES.

SIR: In his review of sixty cases of gastrectomy, Mr. Grayton Brown quotes my experience on anæsthesia. His remarks call for comment on three points.

Firstly, mortality. Reports on mortality are valueless, unless they include an account of important factors in mortality. These are age, sex, site and degree of ulceration, complicating diseases, method of selection, how many patients were declined operation on account of the gravity of the local or general condition, and in how many cases other operations were done instead of gastrectomy. Unless attention is paid to these points we are faced with the absurd conclusion that modern advances are not advances. Over thirty years ago, surgeons secured a mortality of under 1·5% by paying attention to these factors.

Secondly, Mr. Grayton Brown states, "there is no doubt that general anæsthesia is more satisfactory" than other forms. On the contrary, there is considerable doubt. Personally, I have achieved the greatest satisfaction for patient and surgeon when, at the end of a gastrectomy under local anæsthesia, the patient, in excellent condition, declares himself to be feeling fine and readily does his arm, leg and breathing exercises before he leaves the operating table. In a few cases they have even declared their wish for a good feed. I have not always been able to achieve such success. But I have a next best, with advantages peculiar to itself, combined general and local anæsthesia. During general anæsthesia, Dr. S. V. Marshall has encouraged me to use abdominal wall and splanchnic block. He finds that these help his own combination. His results have been most satisfactory and impressive. Many of his patients respond to a question at the end of the operation. I have also achieved great satisfaction when a junior surgeon trained by myself reported with pride that he was called to see a patient seriously reduced by intractable hæmatemesis in a remote hospital with no specialist anæsthetist available and that he saved the situation by a gastrectomy under local anæsthesia. Mr. Grayton Brown excludes such difficulties from his series. To general anæsthesia alone, I would give third place.

Thirdly, I agree with Mr. Grayton Brown that the form of anæsthesia must be adapted to the surgeon. The surgeon with neither experience nor competence in local anæsthesia had better avoid the method until he has equipped himself. But in any case, whatever his equipment, he should avoid the logical fallacy of stating general conclusions from a particular experience, of one method.

Yours, etc.,

235 Macquarie Street, Sydney,
August 15, 1951.

V. J. KINSELLA.

Post-Graduate Work.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

PROGRAMME FOR OCTOBER.

Country Courses.

Week-End Course at Horsham.

A WEEK-END refresher course will be held at the Horsham Base Hospital on October 6 and 7. The programme is as follows:

Saturday: 3 p.m., Dr. Ian Stahle, "Practical Dermatological Problems"; 8 p.m., Dr. Colin Laing, "X-Ray Diagnosis of Gastro-Intestinal and Lung Pathology".

Sunday: 10 a.m., Dr. Noel Box, "Recent Developments in Some Ear, Nose and Throat Conditions of General Interest".

The fee for this course is £1 11s. 6d., or 10s. 6d. per demonstration, and enrolments should be made with Dr. A. L. Bridge, Lister House, Horsham.

Demonstration at Flinders Naval Depot.

A demonstration will be given at Flinders Naval Depot at 2.30 p.m. on Wednesday, October 10, by Dr. A. E. Coates on "Recent Advances in Surgical Practice". This is by arrangement with the Royal Australian Navy.

Overseas Lecturer.

Dr. Paul Wood, O.B.E., M.D., F.R.C.P., Dean of the Institute of Cardiology, National Heart Hospital, London, will visit Melbourne from October 14 to 26, 1951, and will lecture to post-graduates and hold talks with students and staff at the metropolitan hospitals. Details of his programme will be announced later, but attention is drawn to the arrangements already made for him to attend the Royal Melbourne Hospital post-graduate meeting, the programme of which is published in this issue.

Symposium on Infectious Diarrhœa.

On Monday and Tuesday, October 22 and 23, 1951, there will be a review of knowledge in regard to epidemiology, bacteriology, clinical features and treatment of infectious diarrhœa. This has been arranged by the Melbourne Permanent Post-Graduate Committee in consultation with the Dean of the Faculty of Medicine, Professor R. D. Wright, and Dr. Stanley Williams. The programme is as follows:

Monday, October 22: 2.15 p.m., Professor S. D. Rubbo, "Epidemiology of Infectious Diarrhœa"; 2.45 p.m., Dr. Rose Mushin, "The Bacteriology of Infectious Diarrhœa"; 3.30 p.m., Dr. D. A. Denton, "Distortion of Body Fluids Produced by Diarrhœa".

Tuesday, October 23: 10 a.m., clinical and pathological demonstrations by the staff of the Children's Hospital; 2.15 p.m., Dr. Howard Williams, "The Clinical Picture and Treatment of Infectious Diarrhœa in Children"; 2.45 p.m., Dr. Alan Williams, "The Bacteriology of Patients Attending the Children's Hospital Suffering from Infectious Diarrhœa during the Past Year"; 3.30 p.m., Dr. R. R. Andrew, "Clinical Features of Infectious Diarrhœa in Adults".

Afternoon lecture-demonstrations will take place in the main lecture theatre at the Royal Melbourne Hospital. The clinical and pathological demonstrations on Tuesday morning will be conducted in the lecture theatre at the Children's Hospital.

Entry to this review is without charge, and all members of the medical profession are invited to attend. The Post-Graduate Committee urges that as much consideration as possible be given to this very important aspect of medical practice.

Inquiries.

Inquiries regarding all the above courses should be addressed to the Melbourne Permanent Post-Graduate Committee, 394 Albert Street, East Melbourne. Telephone: JM 1547-1548.

THE ROYAL MELBOURNE HOSPITAL.

A POST-GRADUATE MEETING will be held at the Royal Melbourne Hospital, Grattan Street, Parkville, Victoria, from October 24 to 26, 1951. The programme is as follows:

Wednesday, October 24: 9.30 a.m., Dr. Julian Smith, "The Management of Ulcerative Colitis"; 10 a.m., Dr. Ian O. Stahle, "The Management of Common Skin Diseases"; 10.30 a.m., Dr. Paul Jones, "The Treatment of Carcinoma of the Colon"; 11.30 a.m., Dr. A. J. M. Sinclair, "Psychosomatic Medicine"; 12 noon, Dr. W. E. A. Hughes-Jones, "The Repair of Hernia"; 2.30 p.m., Dr. Paul Wood, "Auscultation of the Heart"; 4.15 p.m., Dr. C. H. Fitts, "Cardiac Manifestations of Pulmonary Disease".

Thursday, October 25: 9.30 a.m., Dr. A. E. Coates, "The Indications for Sympathectomy"; 10 a.m., Dr. W. H. J. Moore, "The Management of Acute Retention"; 10.30 a.m., Dr. J. Grayton Brown, "Abdominal Incisions"; 11.30 a.m., Dr. J. H. Shaw, "Sinusitis"; 12 noon, Dr. J. B. Turner, "The Management of Common Rectal Disorders"; 2 p.m., Dr. G. A. Penington, "The Management of Subacute Bacterial Endocarditis"; 2.30 p.m., Dr. L. E. Rothstadt, "Some Aspects of Coronary Artery Disease"; 3 p.m., Dr. J. I. Hayward, "The Place of Surgery in Heart Disease"; 4.15 p.m., demonstration of patients in Ward 5 West by Dr. Paul Wood.

Friday, October 26: 9.30 a.m., Dr. G. R. A. Syme, "The Indications for Surgery in the Treatment of Goitre"; 10 a.m., Dr. B. T. Keon-Cohen, "Acute Backache"; 10.30 a.m., Dr. E. E. Dunlop, "Some Pitfalls in Upper Abdominal Diagnosis"; 11.30 a.m., Dr. R. S. Hooper, "Head Injuries"; 12 noon, Dr. L. W. Gleadell, "Cervicitis"; 2 p.m., Dr. K. J. Grice, "Aortic Valvular Disease"; 2.30 p.m., Dr. J. L. Frew, "Hypertensive Heart Disease"; 3 p.m., Dr. M. J. Etheridge, "Mitral Stenosis"; 4.15 p.m., Dr. J. H. Bolton, "Circulatory Changes in Diphtheria".

In addition to the above programme there will be a display of X-ray films, electrocardiograms, diagrams and pathological specimens in the clinical room off Ward 5 West. Dr. Paul Wood's clinical demonstration will be given in Ward 5 West, and the patients demonstrated will be available for examination in the ward on the following day.

The Friday lunch clinico-pathological meeting will take place as usual, and cases of cardiological interest will be discussed.

The normal activities of the hospital will carry on during the meeting, and visitors are welcome to attend the operating theatres and ward rounds, should they so desire.

Inquiries may be addressed to any of the following: Dr. J. L. Frew, sub-dean of the clinical school, at the Royal Melbourne Hospital, or at 34 Queens Road, Melbourne (Windsor 4147); Dr. Bryan Keon-Cohen, at the Royal Melbourne Hospital, or 85 Spring Street, Melbourne, C.1 (JM 1363); the Melbourne Permanent Post-Graduate Committee, 394 Albert Street, East Melbourne (JM 1547, JM 1548).

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held in the Anatomy Lecture Theatre, Frome Road, Adelaide, on July 6, 1951.

A Reconsideration of Central Respiratory Control.

MR. D. I. B. KERR, in a paper entitled "A Reconsideration of Central Respiratory Control", showed how the changing background of neurological knowledge and technique had influenced the interpretation of experimental data relating to the problem of the origin of respiratory periodicity. He said that the latest concept of respiration reverted to the classical view that the respiratory centre generated its rhythm autonomously. Apneusis, upon which the older theories of respiration had been based, was now explained as an over-facilitation occluding the normal medullary rhythm. That facilitatory influence was considered to arise in the brain stem reticular formation defined by Magoun.

In point of fact, Mr. Kerr explained, even that notion required further analysis, since the inspiratory centre lay intermixed with the inhibitory reticular formation, whilst the expiratory centre occupied part of the more extensive brain-stem facilitatory reticular formation. The feed-back concept of respiratory control could be further challenged upon the grounds of the expiratory dominance found after low decerebration in cat, dog and rabbit.

Mr. Kerr went on to say that "Myanesin", active against reticular influences in the somatic sphere, abolished apneusis. That was taken to show that the facilitatory system was overactive in that condition. In Adelaide it had been taken up with a view to finding the site of action of the facilitation. It required a greater knowledge of the actions of "Myanesin" on systems affecting respiration. As a start the vagal influences had been studied during administration of the drug. "Myanesin" abolished, enhanced or left untouched a repetitively elicited partial vagal respiratory inhibition. The results suggested the need for further work in even this system.

In conclusion, Mr. Kerr said that a more complete functional analysis of the systems active on respiration was required. This should be on a comparative basis and should include more anatomical investigation of the respiratory centre itself.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Numbers 57 and 61. of August 2 and 16, 1951.

PERMANENT NAVAL FORCES OF THE COMMONWEALTH (SEA-GOING FORCES).

Emergency List.

Resignation.—The resignation of Ronald Cuttle of his appointment as Surgeon Lieutenant is accepted, dated 12th June, 1951.

AUSTRALIAN MILITARY FORCES.

Permanent Military Forces.

Royal Australian Army Medical Corps.

NX700199 Captain E. J. Trenerry is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (2nd Military District), 16th June, 1951.

To be Captain, 2nd April, 1951.—3/40053 Donald Headley (Captain) (Short Service Commission for a period of four years).

Reserve Citizen Military Forces

Royal Australian Army Medical Corps.

The following officers are placed upon the Retired List with permission to retain their rank and wear the prescribed uniform, 26th June, 1951:

2nd Military District.—Majors S. D. Allen, J. C. Balzer, A. M. Barron and L. J. Cains, Captains M. Allen, C. T. Allworth, H. A. Annetts, L. C. A. Ariotti, T. P. G. Bateman, J. M. Banks, A. Bentivoglio, N. A. Brandt, R. I. Campbell, J. Colman, R. D. Condon, L. D. Bertinshaw, I. S. Booth, T. L. Brereton, G. M. Brodie, C. Broel, Honorary Captains T. Barry, A. Bellhouse, A. E. Bestic, A. S. Boyd and J. Breine, Lieutenants M. G. Alley, M. I. Angus, J. R. Carlisle, E. A. Clarke, T. A. Biddolph, K. R. Bigg and E. M. Bishop.

2nd Military District: To be Honorary Colonel.—Lieutenant-Colonel R. G. Woods, E.D.

3rd Military District: To be Honorary Captain, 8th June, 1951.—Rothwell Allan Hill.

The notifications respecting the retirement of the following officers which appeared in Executive Minute No. 188 of 1947, promulgated in *Commonwealth Gazette* No. 241 of 1947, are withdrawn. 1st Military District: Major J. E. C. Aberdeen, Captain J. C. Squires, Honorary Captains A. Harrison and H. D. Ashton, and Lieutenants A. J. Clark, J. D. Mabbett, E. L. Sue, H. C. Wakefield and J. L. H. Wassell.

The following officers are placed upon the Retired List with retention of rank and with permission to wear the prescribed uniform, 13th July, 1951: 2nd Military District: Lieutenant-Colonel (Honorary Colonel) J. Leah, C.B.E., E.D., Lieutenant-Colonel H. W. Wunderly, Major C. R. Furner, Captains J. Fitzherbert and T. J. Gibson. 6th Military District: Captain (Honorary Major) R. J. Hudson.

Citizen Military Forces.

Eastern Command: Second Military District.

Royal Australian Army Medical Corps (Medical).—2/70937 Captain A. L. Hellestrand is appointed from the Reserve of Officers, 31st January, 1951 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 49 of 1951, promulgated in *Commonwealth Gazette* No. 23, of 1951). 2/50474 Colonel A. M. McIntosh is placed upon the Retired List (2nd Military District) with permission to retain his rank and wear the prescribed uniform, 1st May, 1951.

Western Command: Fifth Military District.

Royal Australian Army Medical Corps (Medical).—5/26402 Captain E. J. Green is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (5th Military District), 1st March, 1951.

Tasmania Command: Sixth Military District.

Royal Australian Army Medical Corps (Medical).—6/5014 Captain D. P. Churton is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (6th Military District), 1st May, 1951.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED AUGUST 18, 1951.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[3]
Ankylostomiasis	*	..	..	..	..	..	..	..	..
Anthrax	*	..	..	..	..	..	..	..	..
Beriberi	*	*	*	*	*	*	..	*	..
Bilharziasis	*	..	..	..	..	..	..	..	..
Cerebro-spinal Meningitis	3(3)	5(3)	1	1(1)	1(1)	2(2)	..	..	13
Cholera	..	..	..	..	..	..	..	..	..
Coastal Fever(*a*)	*	*	..	*	*	*	*	*	..
Dengue	*	*	*	*	*	*	..	*	..
Diarrhœa (Infantile)	..	..	..	..	..	..	..	..	..
Diphtheria	6(2)	2(1)	1(1)	7(6)	2(1)	..	..	..	18
Dysentery (Amœbic)	*	..	..	..	..	..	..	..	..
Dysentery (Bacillary)	*	4(4)	3(3)	..	..	..	..	..	7
Encephalitis Lethargica	..	1(1)	..	..	..	..	..	..	1
Erysipelas	*	*	*	..	*	*	..	..	..
Filariasis	*	..	..	..	..	..	..	..	..
Helminthiasis	*	..	*	*	*	*	*	*	..
Hydatid	*	1	*	*	..	*	*	..	1
Influenza	*	*	*	..	*	*	..	*	..
Lead Poisoning	*	*	..	*	*	*	*	*	..
Leprosy	..	..	..	..	..	..	..	..	..
Malaria(*b*)	*	..	..	..	..	..	..	..	..
Measles	*	..	*	108(55)	*	*	..	..	108
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	16(3)	15(3)	19(4)	29(29)	3(1)	..	..	1	83
Psittacosis	*	..	*	..	..	*	*	*	..
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella(*c*)	*	8(5)	1	*	9(2)	*	..	..	18
Scarlet Fever	20(13)	28(18)	2	9(6)	2(2)	4(2)	..	..	65
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	*	..	1(1)	*	*	*	*	*	1
Trachoma	*	..	*	*	*	*	*	*	..
Tuberculosis(*d*)	51(36)	27(21)	15(12)	4(3)	7(4)	6(2)	..	..	110
Typhoid Fever(*e*)	..	1(1)	..	..	..	..	..	..	1
Typhus (Endemic)(*f*)	1(1)	..	2(1)	..	1(1)	..	..	..	4
Undulant Fever	..	1(1)	..	..	..	..	..	..	1
Weil's Disease(*g*)	*	*	2	*	*	*	*	*	2
Whooping Cough	*	*	*	2(2)	*	*	..	..	2
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] The form of this table is taken from the *Official Year Book of the Commonwealth of Australia*, Number 37 1946–1947. Figures in parentheses are those for the metropolitan area.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from the Northern Territory.
* Not notifiable.
(*a*) Includes Mossman and Sarina fevers. (*b*) Mainly relapses among servicemen infected overseas. (*c*) Notifiable disease in Queensland in females aged over fourteen years. (*d*) Includes all forms. (*e*) Includes enteric fever, paratyphoid fevers and other Salmonella infections. (*f*) Includes scrub, murine and tick typhus. (*g*) Includes leptospiroses, Weil's and para-Weil's disease.

ROYAL AUSTRALIAN AIR FORCE.

Air Force Reserve: Medical Branch.

The following are appointed to commissions with the rank of Flight Lieutenant: Jack Berry Moffat (016067), 29th December, 1950, Peter Ernest Mellows (297517), 16th April, 1951.

Flight Lieutenant D. F. Buckle (033452) is granted the acting rank of Squadron Leader, 1st October, 1950.

The appointment of Flight Lieutenant R. R. Collman (034061) is terminated, 12th April, 1951.

Obituary.

AINSLIE FRANCIS AGNEW.

WE are indebted to Dr. Archie S. Anderson for the following appreciation of the late Dr. Ainslie Francis Agnew.

Dr. Ainslie Francis Agnew, whose sudden and untimely death was recorded in a recent number of this journal, was the second son of the late Dr. J. F. Agnew, of Erin Street, Richmond, and later Principal Repatriation Medical Officer for the Commonwealth. Ainslie was educated at Scotch College, Melbourne. He was *dux* of the "Prep." and afterwards was a school prefect, was a member of the first eleven, and represented his house at football. He did his medical course at the University of Melbourne and graduated M.B., B.S. in 1926. At the age of eighteen years he volunteered for the first Australian Imperial Force, but was refused; he was finally accepted a short time before the cessation of hostilities. After a short term as resident medical officer to the Alfred Hospital, he went, in a similar capacity, to Mildura. At the conclusion of this appointment he did *locum tenens* work for a time and then joined the staff of the Ipswich Hospital, Queensland, as second-in-command. For seven or eight years he held this post, but resigned in 1941 in order to join the second Australian Imperial Force, in which he served for five years. After an irksome period at Alice Springs, he achieved his heart's desire by going on active service as a medical officer on the hospital ship *Wanganella*, and later as medical officer to the 2/142 Australian General Transport Company in New Guinea, whence he was invalided home a few weeks before "V.P." Day. He remained in the army until 1948, when he joined the resident medical staff of the Repatriation General Hospital, Heidelberg. He was holding this post when, on June 3, 1951, he suffered a severe heart attack and died a few hours later.

Ainslie was not one to seek the limelight, and it was only a few of his intimate friends and his patients who knew his true worth. To him the practice of medicine was a vocation; his adherence to its ethical principles was exemplary and sincere, the welfare of his patients his primary consideration at all times. Though so retiring by nature, he was good company, keenly interested in cricket and football, and possessed of an unusual knowledge and a very discerning judgement of both. He was an upright and honourable gentleman, and the profession which was enriched by his life is made the poorer by his death. To his two sisters, who mourn the loss of a truly devoted brother, we extend our heartfelt sympathy.

Dr. C. H. Fitts writes: Ainslie Agnew and I lived in the same street in times when people belonged to the suburb they lived in. We walked willingly to school together and came home and played together for eight years, until, at the age of fourteen years, our ways parted. In those early years I recall Agnew as *dux* of his form and a leader in games. We scarcely met again until after we had both graduated from the university, and for a time were resident medical officers at the Alfred Hospital in the same year. Those who knew him only from that time would find it hard to believe that the boy was not the father of the man; that the zest and confidence of childhood in a happy environment vanished in the cares and responsibilities that weighed upon him when in manhood he was stretched upon this rough world. The man never did full justice to the boy that I knew. I sometimes think that he was aware of this, for nostalgia was his besetting sin and in his day-dreams he wistfully conjured up the past. Those who care to read between the sympathetic lines of Dr. Archie Anderson's appreciation may note that when it was a question of himself and his career he rarely left the shelter of an institution; when it was a question of service to his country or his family he shirked no responsibility. There were many things in his life that were of good report. Honesty and loyalty walked with him all his days. Quietly he has passed over, and the trumpets will have sounded for him on the other side.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Brown, John Fergus Francis, M.B., B.S., 1948 (Univ. Sydney), c.o. Public Health Department, Madang, New Guinea.

Shellshear, Stuart Wilton, M.B., B.S., 1951 (Univ. Sydney), The Maitland Hospital, Maitland.

Ming, Edna Gork, M.B., B.S., 1942 (Univ. Sydney), Highview Avenue, Manly Vale.

Diary for the Month.

SEPT. 18.—New South Wales Branch, B.M.A.: Medical Politics Committee

SEPT. 19.—Western Australian Branch, B.M.A.: General Meeting.

SEPT. 20.—New South Wales Branch, B.M.A.: Clinical Meeting.

SEPT. 20.—Victorian Branch, B.M.A.: Executive Meeting.

SEPT. 25.—New South Wales Branch, B.M.A.: Ethics Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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